

June 1961

Big savings from M/W radio

pg. 43

Two-way TRACK and

STRUCTURES

Special report

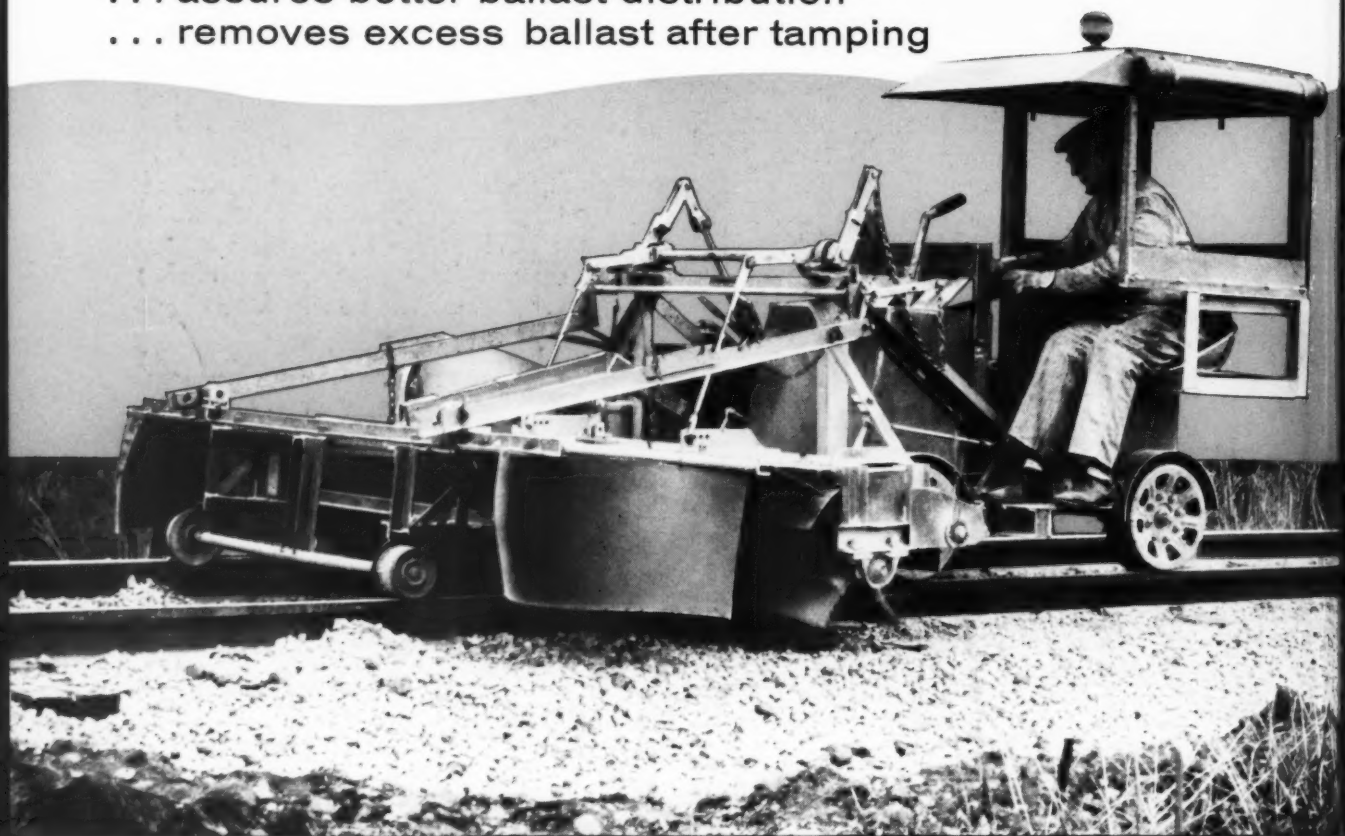
EPOXIES

Versatile tool for
many railroad jobs

A Simmons-Boardman TIME-SAVER Publication

The NORDBERG "TRAK-SWEEPER"

... assures better ballast distribution
... removes excess ballast after tamping



The Nordberg "Trak-Sweeper" . . . an efficient, low cost maintenance machine that makes track raising operations easier and less expensive.

Used ahead of a tamper, the Trak-Sweeper levels ballast in the track and across the crib area, providing proper ballast distribution for better tamping. When used after tamping, the Trak-Sweeper removes excess ballast from the top of ties and deposits it on the shoulders.

The "Trak-Sweeper" is but one of the Nordberg Mechanical Muscles® for Organized Mechanization. Write for further details.

FEATURES

Light Weight—Aluminum is used wherever possible in its construction. The machine does not disturb the surface of track when operating between jacking means and tamper.

Clean Sweeping—The Trak-Sweeper utilizes a rotating impeller with radially-mounted heavy rubber blades.

Hydraulically Propelled — "Super low" working speed of approximately 10 ft. per minute . . . travel speeds to 15 mph.

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NORDBERG

Mechanical Muscles®



R280-R

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... Economy

... Versatility

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.

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BETHLEHEM STEEL



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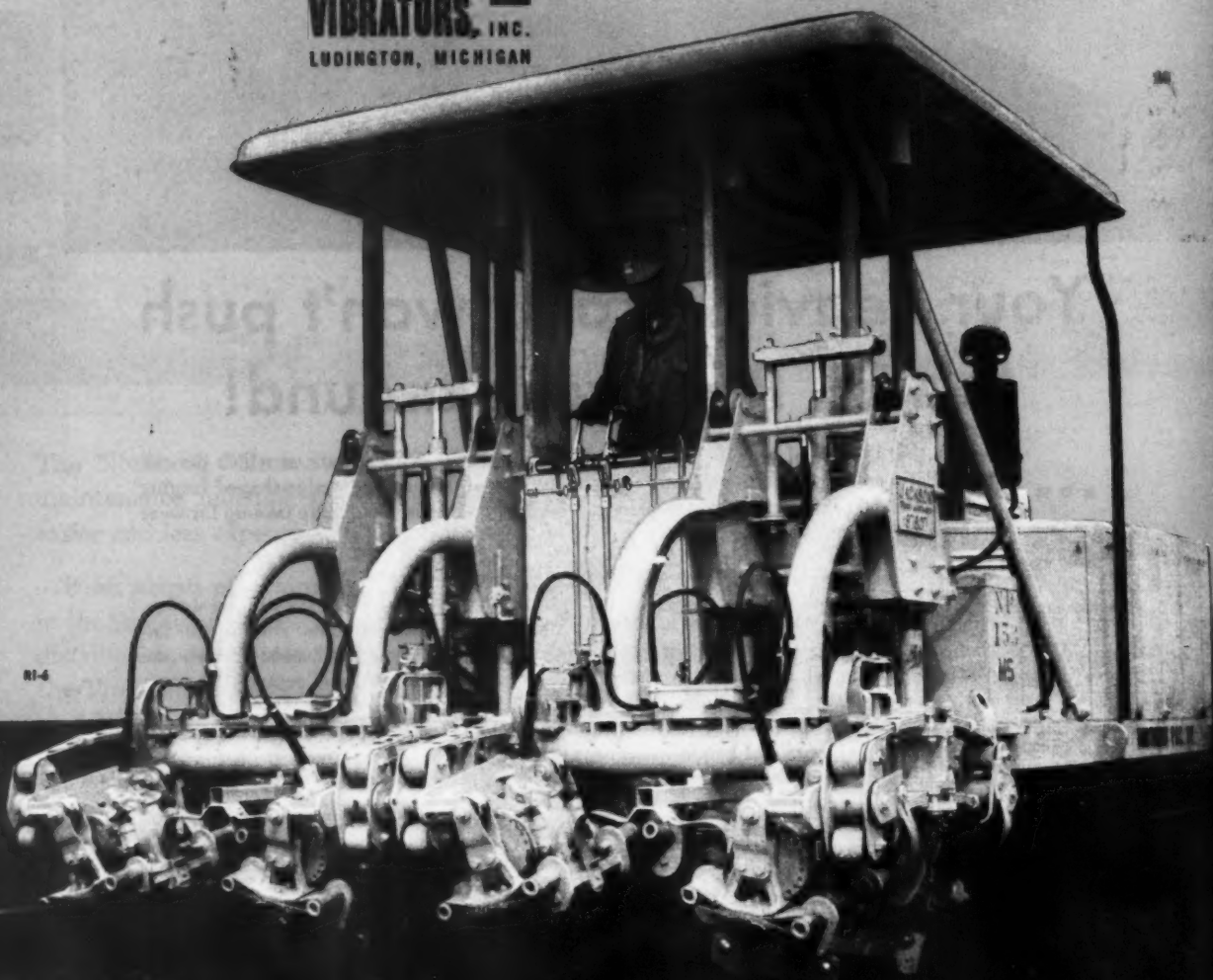
the JACKSON TRACK MAINTAINER

offers this unbeatable combination

unmatched versatility: The JACKSON MAINTAINER is the ONLY machine that will give you perfect, long lasting tamping in all production work regardless of height of track lift in any kind and size of ballast. It is, also, by far the best tamper for every kind of smoothing and spotting job where top quality is demanded. **top speed:** True maximum footage rates of highest quality tamping is the day in and day out performance of the MAINTAINER. **true economy:** The exceptionally high quality of tamping achieved with the MAINTAINER is longer-lasting . . . and hence, considerably more economical in the long run. Machine maintenance and repair are the lowest by comparison. **outstanding reliability:** More than any machine in its class, the MAINTAINER is ready to go and stay on the job with only ordinary routine care and minor adjustment to job conditions. **unequaled service:** JACKSON backs the MAINTAINER with field engineers who have the experience and know-how to capably and wholeheartedly assist you with all phases of use, care, operation, application and methods for getting everything possible from your JACKSON TRACK MAINTAINER.

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EPOXIES—An RT&S staff report

New, versatile tool for many railroad jobs 25

Tells what epoxies are and describes the physical properties that adapt them to various applications in railroad structures.

Concrete bridge has epoxy shear keys, waterproofing 29

Describes how epoxy formulations were used by the Rock Island in the construction of two 33-ft precast, prestressed-concrete spans.

Bonds, patches, coats old concrete with epoxies 32

How the Clinchfield repaired old and badly deteriorated concrete in piers and pedestals of a long steel viaduct.

Big savings from M/W radio on the EJ&E 35

Communication network linking supervisors and foremen saves time and money, aids in emergencies.

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Supply trade news 58

◀ Don't miss . . .

Railroad use of metal buildings has shown rapid growth. What is behind this development? What improvements in such buildings have spurred their acceptance? Read the whole story in a special report.

. . . in the July issue



*"I never knew there was such choice scenic attractions
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Let us solve your weed control problem with the right chemicals and application service.

We offer the most comprehensive line of weed, grass and brush killers available . . . each product is formulated to solve specific vegetation problems and each is proved by extensive railroad use.

Chipman Railroad Application Service includes both highly experienced personnel and the most modern equipment for efficient, economical treatment.

Chipman chemicals and application service are backed by almost a half-century of weed control in the United States and many foreign countries.

Your inquiry will receive our prompt attention.

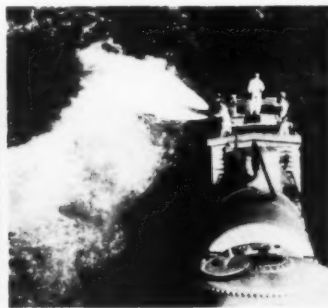
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DO YOUR MEN RISK "THE DIPPER OF DISEASE"?



"The Dipper of Disease" — the old-fashioned, germ-laden, mouth-to-mouth drinking vessel which spreads infection and sickness. Modern standards of drinking water service prohibit its use.

Let AJAX WATER SERVICE Help Keep Your Maintenance Budget in Line

It can . . . by reducing absenteeism . . . saving time . . . promoting safety . . . improving morale

Make-shift arrangements are rarely economical. There's no economy in the "pail and dipper" combination. Why not look into the advantages of the portable AJAX Refreshing Drinking Water Service. You'll be surprised at its low cost. You'll be pleased at how much it can help keep your maintenance costs down.

The AJAX Refreshing Drinking Water Service can go anywhere your men go — and helps your budget. It reduces absenteeism because personal service AJAX Cups effectively reduce the spread of colds and other diseases. It encourages the water consumption needed for good health. Reduces fatigue. Increases worker efficiency. Saves time by eliminating long walks. A refreshing drink from a comfortable-to-use AJAX Cup goes far toward building morale. Imprinted, AJAX Cups promote safety. And they solve the "dipper problem" forever.

Find out how AJAX Water Service can help keep *your* maintenance budget in line. For detailed information, write today.

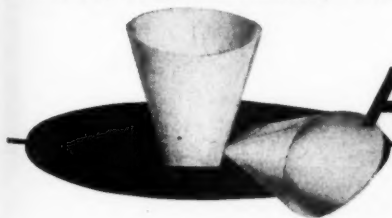
HOW AJAX SERVICE HELPS ONE RAILROAD SAVE



Reports from one large road indicate that it enjoyed worthwhile savings in its maintenance budget after it adopted the complete AJAX Water Service. One big advantage is the fact that the standard installation fits right onto the track maintainer itself. Always ready; always at hand.

The AJAX Water Cooler is a heavy duty, 5-gallon unit. It is easy to sterilize and keep clean. Well insulated to keep water cool. The AJAX Cup Dispenser can be mounted on the cooler or attached separately to the track maintainer. It holds 300 AJAX Cups in the 4- or 6-oz. size. AJAX is the cup that dispenses open, ready to use. Available plain or imprinted with safety messages.

If you are looking for a way to increase worker efficiency and still keep your budget in line, look into AJAX.



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RAILWAY TRACK and STRUCTURES

June, 1961

7

New steels are
born at
Armco



How Armco Liner Plate can help you cut tunneling costs

By tunneling with Armco Liner Plate, you not only keep your traffic rolling on schedule, but reduce costs as well. Because of a special deep-corrugation, Armco Liner Plate provides higher strength per pound of weight than any other commonly used liner plate.

This means you pay less for material without sacrificing strength. In addition, Armco Liner Plate comes in a full range of diameters, gages, shapes, and protective coatings.

This gives you **exactly** what you need for tunneling or re-lining.

Armco Liner Plate can be fabricated to make complex shape changes as well as turns both in line and grade. For complete technical information, write: **Armco Drainage & Metal Products, Inc.**, subsidiary of Armco Steel Corporation, 6701 Curtis Street, Middletown, Ohio.



For strength,
durability,
economy



Drainage & Metal Products

new...COMPUTER-CONTROLLED SMOOTHNESS IN GRADE!

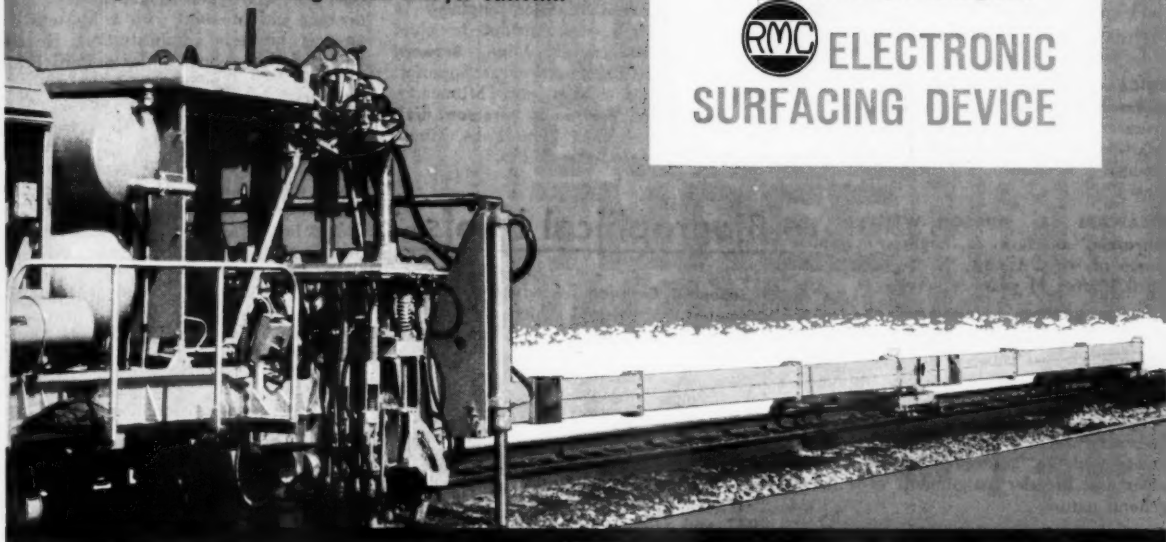
An advanced concept which establishes new standards of smoothness in grade! Operator of the jacking, tamper raises track until a single direct-reading meter indicator shows zero. Track then is tamped to produce precisely the desired elevation and held to grade. • The computer automatically calculates desired grade, while a separate meter indicates cross level. **Main components:** two 30' long aluminum beams supported on two carts ahead of the tamper; foresight on each cart; potentiometer and other equipment for evaluating true grade; direct-reading meter. *Ask for bulletin.*



Left meter shows track should be jacked
... at right, track jacked to grade.



**ELECTRONIC
SURFACING DEVICE**



New... Simplified Tool for Surfacing Low Joints

Giving direct readings of low joints to the operator of a smoothing and spotting tamper equipped with jacks... the RMC Joint Surfacing Device consists of two 14-foot long aluminum beams, spring-tensioned cables, separate indicators for each rail. *Ask for bulletin.*



Railway Maintenance Corporation

Box 1886

Pittsburgh 30, Pa.

CANADIAN NATIONAL—**R. L. Gray**, area engineer at Capreol, Ont., has been appointed engineer maintenance of way at Toronto, Ont., succeeding **F. S. Hutton** whose promotion to assistant chief engineer of the Grand Trunk Western at Detroit, Mich., was announced in the May issue. **L. E. Dolphin** has been appointed project engineer (access lines) at Toronto, Ont.

CANADIAN PACIFIC—**F. C. Zettler**, bridge and building master at Schreiber, Ont., has been transferred to Toronto, Ont.

CENTRAL OF GEORGIA—**H. C. Windham**, track supervisor at Sylacauga, Ga., has been promoted to assistant trainmaster at Gordon, Ga.

CHICAGO & EASTERN ILLINOIS—**Herbert Huffman**, engineer maintenance, has been promoted to chief engineer, with headquarters as before at Danville, Ill., to succeed **I. A. Moore**, who retired effective May 1.

DELAWARE & HUDSON—**William J. Schramm**, assistant to engineer maintenance of way, Albany, N. Y., retired on April 1 after 44 years of service.

DETROIT, TOLEDO & Ironton—**Charles L. Towle**, chief engineer, Dearborn, Mich., has been elected to the newly created position of assistant vice president and chief engineer. In his new position, Mr. Towle will continue in direct charge of the engineering and maintenance-of-way departments and, in addition, will carry out other and broader assignments of a more general nature.

ERIE-LACKAWANNA—**Richard J. Dowling**, roadmaster at Scranton, Pa., retired recently after more than 39 years of service.

MISSOURI PACIFIC—**Stanley G. Urban**, architect of the Texas & Pacific at Dallas, Tex., has been promoted to engineer of buildings of the MP and T&P, with headquarters at St. Louis, Mo. Mr. Urban succeeds **A. L. Becker** who has retired after 44 years of service. **Walter W. Salisbury**, special engineer at Kansas City, Mo., retired on April 30.

William H. Hobbs, chief engineer, St. Louis, Mo., has retired, effective May 31, after 49 years of service.

NEW YORK CENTRAL—The following changes have occurred recently: **R. W. Orr**, assistant district engineer at Cleveland, Ohio, to district engineer of track there; **C. E. O'Connor**, engineer of bridges at Cleveland, to district engineer of structures there; **W. W. Kerr**, assistant division engineer at Chicago, to division engineer of track there; **W. A. Marx**, assistant division engineer at Toledo, Ohio, to division engineer of track there; **R. O. Beers**, assistant division engineer at Cleveland, to division engineer of track there; and **R. A. Cameron**, supervisor of material distribution at Cleveland, to materials engineer there.

NORTH WESTERN—**Anthony Clark**, foreman bridges and buildings on the Dakota division, has been promoted to assistant supervisor bridges and buildings at Norfolk, Neb., succeeding **Howard Gueller** who has been transferred to Green Bay, Wis.

SANTA FE—**Harold C. Boley**, assistant engineer at Topeka, Kan., has been promoted to valuation engineer there, succeeding **W. H. Lieurance** whose retirement was noted in the May issue.

SOO LINE—The following changes have occurred recently as a result of a reorganization of this road's divisional set-up: **Bertel E. Pearson**, division engineer at Marquette, Mich., to assistant to chief engineer at Minneapolis, Minn.; **Bernard R. Prusak**, division engineer at Superior, Wis., transferred to Shoreham (Minneapolis), Minn.; and **Warren B. Peterson**, division engineer at Thief River Falls, Minn., transferred to Enderlin, N. D.

Biographical briefs

Joseph C. Brennan, 54, who was recently promoted to assistant chief engineer of the Delaware & Hudson at Albany, N. Y. (RT&S, Dec., p. 10), was born at Orange, N. J., and graduated from Rensselaer Polytechnic Institute in 1929 with a Civil Engineering degree. Mr. Brennan entered the service of the D&H in 1930 as a draftsman. He was promoted to transitman in 1933, assistant engineer in 1941, assistant construction engineer in 1947 and engineer of track in 1948. In 1951 he was appointed division engineer. Mr. Brennan was advanced to engineer maintenance of way in 1956 and division superintendent, transportation department, the following year. He was promoted to assistant superintendent, system, in 1958, the position he held at the time of his recent promotion.

William M. Davis, 51, who was recently promoted to roadmaster on the Frisco at Amory, Miss. (RT&S, Dec., p. 10), was born at Blue Springs, Miss. He entered the service of the Frisco in 1929 as an extra gang and section laborer. Mr. Davis was promoted to section foreman in 1933 and system steel gang foreman in 1949. He was further promoted to assistant roadmaster at Thayer, Mo., in 1957, the position he held at the time of his recent promotion.

Charles R. Fulghum, 29, who was recently promoted to supervisor track on the Illinois Central at Mendenhall, Miss. (RT&S, Oct., p. 10), was born at Jackson, Tenn., and graduated from the Alabama Polytechnic Institute in 1954 with a Bachelor of Science degree in civil engineering. He entered the service of the IC in 1951, working summers, first as engineer apprentice and later as chainman. In

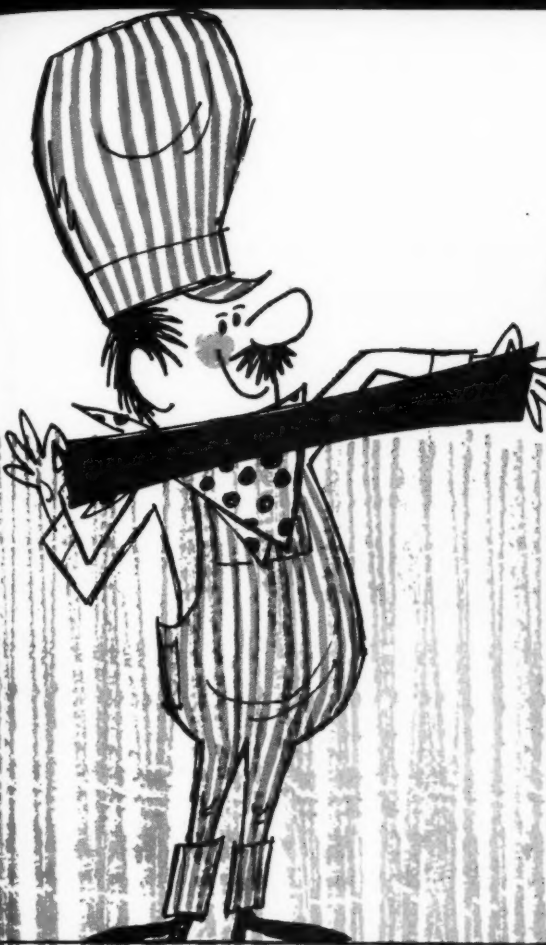
1954 he was appointed junior engineering aide. From May 1954 to July 1956 he was in military service. In November of the latter year he was promoted to instrumentman at Chicago. Mr. Fulghum was further promoted to assistant supervisor in 1958, the position he held at the time of his recent promotion.

William L. Paul, 30, who was recently promoted to assistant division engineer on the Santa Fe at San Bernardino, Calif. (RT&S, Nov., p. 10), was born at Alameda, Calif., and graduated from the University of California in 1953 with a Bachelor of Science degree in civil engineering and in 1956 with a Master's degree in business administration. He also attended that school under a Ford Foundation fellowship for graduate study in transportation economics. Mr. Paul entered railroad service in 1950 with the Southern Pacific as a technical student. The following year he joined the Santa Fe as a junior draftsman at Richmond, Calif., being promoted to rodman at Los Angeles, Calif., in 1952. Two years later he was further promoted to transitman at Fresno, Calif. In January 1960 he was advanced to roadway assistant at Los Angeles, the position he held at the time of his recent promotion.

Robert L. Williams, who was recently promoted to office manager, office of vice president and chief engineer, of the Illinois Central at Chicago (RT&S, Jan., p. 10), was born at Milwaukee, Wis., and graduated from the University of Illinois in 1941 with a Bachelor of Science degree in civil engineering. Mr. Williams entered the service of the IC in 1941 as a chainman at Carbondale, Ill., being promoted to rodman there the following year. He was further promoted to assistant supervisor at Carbondale in 1943, serving also in that capacity at Champaign, Ill., and Waterloo, Iowa, to supervisor track at Freeport, Ill., in 1946, later being transferred to East St. Louis, Ill., and to assistant engineer at Chicago in 1957. Mr. Williams was advanced to special engineer in 1960, the position he held at the time of his recent promotion.

James Hope, 65, who recently retired as engineer work equipment, system, of the Rock Island at Chicago (RT&S, Nov., p. 10), was born at What Cheer, Iowa, and received his higher education at State Manual Training Normal School where he studied mining engineering. Mr. Hope commenced his railroad career in 1926 as an engineer and foreman in the coal mining department of the Rock Island at Melcher, Iowa. He was appointed superintendent at Williamson, Iowa, in 1934, trainmaster at El Reno, Okla., in 1942 and vice president in charge of coal mine operations, at Peoria, Ill., in 1944. Mr. Hope was appointed engineer work equipment, system, in 1952.

(More biographical briefs on page 49)



HOW TO STRETCH YOUR WEED KILLER DOLLAR THREE WAYS

NEW PRODUCTS

UREABOR® 31—New granular combination of 3 proven weed killers for dry application. Kills a greater variety of weeds, more effectively than any other herbicide on the market. One application keeps weeds down for a whole season. Effective control, plus low application rate and ease of application really stretch your weed killer dollar.

UREABOR 62—NEW HIGH CONCENTRATION granular weed killer is chemically the same as UREABOR 31—only double strength—especially designed for the large volume user. Stretches your weed killer dollar even more as you save on freight, handling and application costs.

SERVICE

Only U. S. BORAX offers the services of 23 experienced field men—who know your local weed, soil and weather conditions. They are available now to advise and *show you how* to get the most stretch from every dollar in your weed killer budget.

EQUIPMENT

From yards and switches to rights of way and bridges, U. S. BORAX can recommend a choice of weed killer spreaders from hand operated PCB Spreaders to power driven equipment to give you the most economical herbicide application possible. This equipment is specifically developed to stretch your weed killer dollar by applying U. S. BORAX weed killers most economically in every situation.

Want to learn more about stretching your weed killer dollar? Write today for complete information.

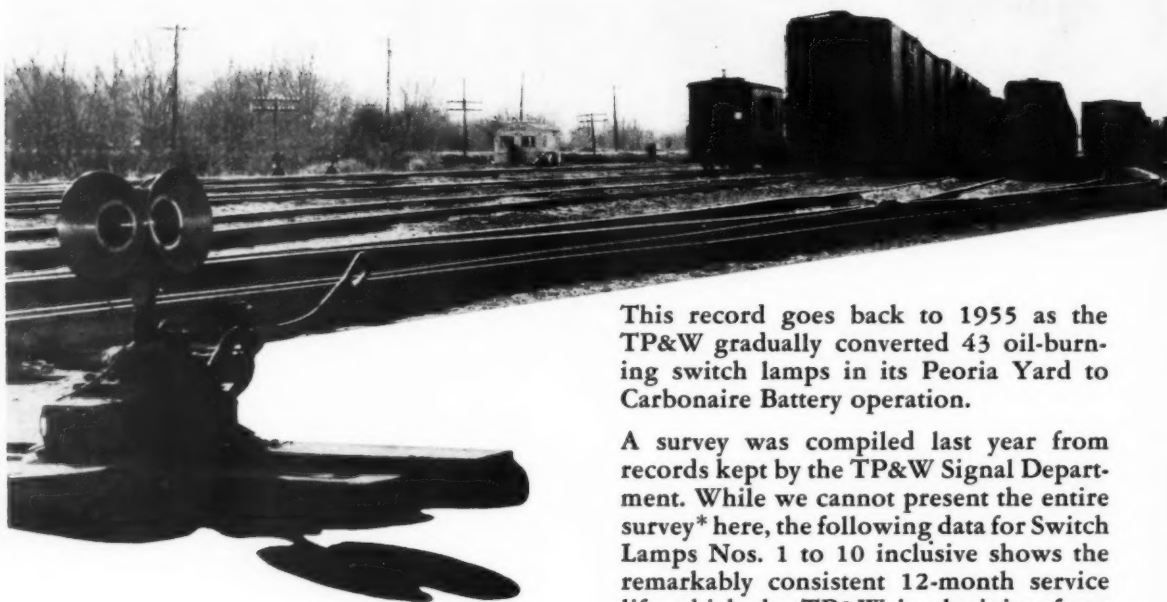

U.S.BORAX

630 SHATTO PLACE, LOS ANGELES 5, CALIFORNIA



THE **TP&W** REPORTS:

AN AVERAGE OF 12 MONTHS SERVICE LIFE FROM EDISON CARBONAIRE BATTERIES IN 43 SWITCH LAMP LOCATIONS



This record goes back to 1955 as the TP&W gradually converted 43 oil-burning switch lamps in its Peoria Yard to Carbonaire Battery operation.

A survey was compiled last year from records kept by the TP&W Signal Department. While we cannot present the entire survey* here, the following data for Switch Lamps Nos. 1 to 10 inclusive shows the remarkably consistent 12-month service life which the TP&W is obtaining from Edison Carbonaire Batteries.

Switch Lamp No.	1	2	3	4	5	6	7	8	9	10
Installation Date	7/14/55	3/15/56	5/28/56	11/1/55	8/8/55	10/4/55	10/4/55	10/4/55	10/4/55	1/16/56
Renewal Date	7/12/56	3/6/57	5/29/57	11/9/56	8/8/56	10/4/56	10/4/56	10/4/56	10/4/56	1/18/57
" "	7/22/57	4/2/58	5/29/58	11/4/57	7/31/57	10/18/57	10/18/57	10/18/57	10/18/57	10/8/58
" "	7/21/58	2/9/59	6/3/59	6/11/58 (switch removed)	8/15/58	10/8/58	10/8/58	10/27/58	10/8/58	8/18/59
" "	7/15/59	11/6/59			8/10/59	8/24/59	8/28/59	10/8/59	10/15/59	

Maintainer Jim Blain (left) and Tom Gallagher, Supt. of Telegraph and Signals (right) look on while Dick Chamberlain, Edison Field Engineer, checks out the Carbonaire Battery at Switch No. 7.



All but two of the installations in the Peoria Yard use a 2.7 volt .150 amp. Infro Lamp bulb.

We believe this factual record speaks for itself. And we cite it as still another example of why it pays to specify and to use the Type 2-S-J-1 Edison Carbonaire wherever battery-operated switch lamps are installed.

**A copy of the complete survey will gladly be sent on request.*

THOMAS A. EDISON INDUSTRIES
Primary Battery Division
Bloomfield, New Jersey



... a résumé of current events throughout the railroad world

A considerable part of the "unnecessary" expense caused by work rules applicable to operating employees could be eliminated if management were allowed to establish longer runs, the Presidential Commission investigating the work rules dispute was told by H. Neitzert, management's counsel. A run of 160 miles instead of 100 miles was proposed as the basic-day run for engine crews and freight trainmen. The proposal also contemplates ending union spread-the-work rules which limit monthly miles run by operating employees.

Total benefit payments in 1960 under the Railroad Retirement Act and the Railroad Unemployment Insurance Act come to approximately \$370 million more than tax collections, according to T. H. Healy, management's representative on the Railroad Retirement Board. "Projections over the next five years," he noted, "indicate that disbursements will exceed tax receipts by \$2 billion." Mr. Healy urged Congress to declare a lengthy moratorium against further increases in benefits and the removal of some "gross inequities."

The ICC opposes proposed legislation which would suspend its authority to approve railroad consolidation until December 31, 1962, "to provide Congress with time to review the problems arising from the present merger movement." The commission strongly urged Congress "not to depart from its past consistent policy of fostering and encouraging those unifications of railroads which meet the tests which it has prescribed."

The U.S. Supreme Court has ruled that the Interstate Commerce Act's merger provision do not require a freeze of jobs. Severance pay will suffice. The Court upheld the ICC in the Erie-Lackawanna case by this ruling.

Class I railroads operated in the black in March, but their net income of \$14 million failed to wipe out a January-February deficit of \$28 million. Rate of return in the year ended March 31 averaged 1.68 per cent. Railroad employment declined to 705,847 in mid-March, 10.57 per cent below the comparable March 1960 figure. Biggest decrease was among maintenance employees.

A single federal agency to regulate all forms of transportation is not favored by Senator Magnuson, chairman of the Senate's Interstate Commerce Committee. The senator thinks that any overall look at transportation should be taken by Charles D. Martin, Jr., undersecretary of commerce for transportation.

Mr. Martin thinks the outlook for the common carriers is "bleak" and his office is preparing recommendations for congressional action. Recommendations being "seriously considered" would include calls for "realistic tax and depreciation policies for the railroads, along with a declaration that unjust and undue discrimination in state and local taxes be declared unlawful as a burden on interstate commerce." Also suggested is that "rate policy be reexamined," because the common carrier transportation industry "has been engulfed in a wave of rate cutting."

The New York Central asked the ICC to include it in the proposed N&W-NKP-Wabash merger as an alternative to being made a part of the C&O-B&O affiliation, which the NYC also requested. The road believes it is essential, to assure competitive balance, that each system have single-line access to Pocahontas coal origins and the tidewater ports.

Fairmont

BALLAST MAINTENANCE CAR

One machine does six jobs! Plows, discs, scarifies, shapes, blades and sweeps!

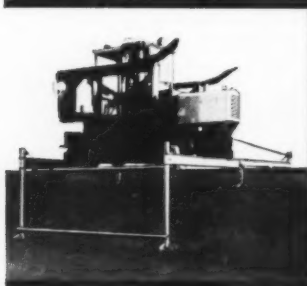
Fairmont's W23 Series A Maintenance Car, with a single operator, does six different jobs to speed ballast drainage and surfacing operations—to help maintenance-of-way dollars go miles farther!

Restore drainage: Scarifiers loosen cemented ballast, pull apart mud dams at tie-ends. Discs rework shoulders, break up clods, kill weeds, establish sod line. Ballast equalizing boxes, working alone or with discs and scarifiers, shape and "equalize" new or existing ballast, fill in low spots, provide uniform shoulders. Ballast bladers are also available.

Surfacing operations: Plow distributes ballast uniformly — moves it from center track to shoulders, from shoulders to center track, or from one shoulder to the other, as required. Track brush attachment sweeps tie surfaces, fills any crib voids, removes excess ballast.

6-cylinder engine, torque converter and 4-wheel drive team up to deliver steady power, even under severest conditions. Hydraulic tool operation gives operator fast, accurate control. And built-in turntable performs so smoothly, one man can turn machine around! Plan now to add the mechanized versatility of the Fairmont W23 to your ballast maintenance operations. Call or write for full information.

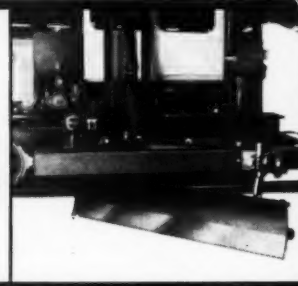
Fairmont equipment is available on lease.



PORTABLE SET-OFF eliminates traveling long distances to sidings in order to clear the way for train movements.



TRACK BRUSH sweeps tie-tops, fills crib voids, removes excess ballast as follow-up to reballasting or track raising operations.



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RAILWAY TRACK and STRUCTURES

June, 1961

15



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Why not recognize quality workmanship?

Practical public relations

Recently, when asked if he worked week-ends, a division engineer replied that he went to the office every Saturday morning. Unless there was something urgent that required his attention, he went home Saturday noon and returned Monday morning. He left word at railroad headquarters where he could be reached while off the railroad.

But, he added with a quizzical look, that didn't mean he wasn't doing any good for his railroad.

He usually played golf Saturday afternoons and Sundays, he continued, and was a member of the local country club and the Kiwanis club. When playing golf and attending meetings he mingled with many men who were shippers on his road, as well as with city leaders. He was on a "first-name" basis with these men.

As a result of these contacts, he was kept abreast of local developments while they were still in the formative stage. Minor irritations of shippers would be expressed to him in a "kidding" way. These he would bring to the attention of the responsible railroad officers so steps could be taken to correct them before they became major complaints. Many times, also, immediate and future plans of the city would be discussed. This foreknowledge often allowed sufficient time for the railroad to formulate a policy if it was to be affected by the plans.

The division engineer felt that these contacts paid off for the railroad as well as affording him needed relaxation.

We agree. Such activities at the local level, whether engaged in by division engineers or supervisors, can be highly profitable for both the individual and his road.

With the emphasis today on cost savings it is natural that track men should endeavor to attain this end by increasing the production of individual gangs. The result is that supervisors who have achieved unusually high rates of production in such activities as putting in ties, laying rail and surfacing track begin to talk about their achievements. Such claims are inevitably a signal for renewal of the old controversy between track men over quantity versus quality.

Claims of high production are frequently challenged on the grounds that superior speed often results in inferior workmanship. There are, doubtless, instances where it can be shown that quality has suffered in the zeal to get more work done. On the other hand any tendency to assume that a high rate of production is incompatible with good workmanship should be avoided.

Perhaps one way to assure that supervisors, in striving for high production, will at the same time give proper attention to the need for quality is to give recognition to excellence in track maintenance through a system of annual inspections, with awards being made to the supervisors in charge of territories with high ratings.

There was a time when it was a fairly common practice to make such annual awards. At an appropriate time during the year, usually in the late summer or early fall, an inspection trip would be scheduled over the entire system, with system, regional and local officers participating. As the inspection train moved over the road each section, supervisor's territory and division was graded. Mostly the grading was done by personal judgment of the various factors—line, surface, etc.—that determine the over-all condition of the track. At least one road, however, used a special inspection car equipped with instruments for measuring and recording the different elements of the track condition.

When the entire system had been inspected ratings were usually established for the different territories and awards made to the division engineers, track supervisors and section foremen whose territories had the highest ratings. On some roads cash awards were made, on others the recognition given took the form of letters of commendation, with the names of the winners being published in the company magazine.

With the coming of the depression of the 'thirties one railroad after another discontinued the practice of making track awards. Today, as far as is known, the practice survives on only one or two lines. Would it be to the railroads' advantage to revive the practice of giving formal recognition to excellence in track maintenance? We believe it would.

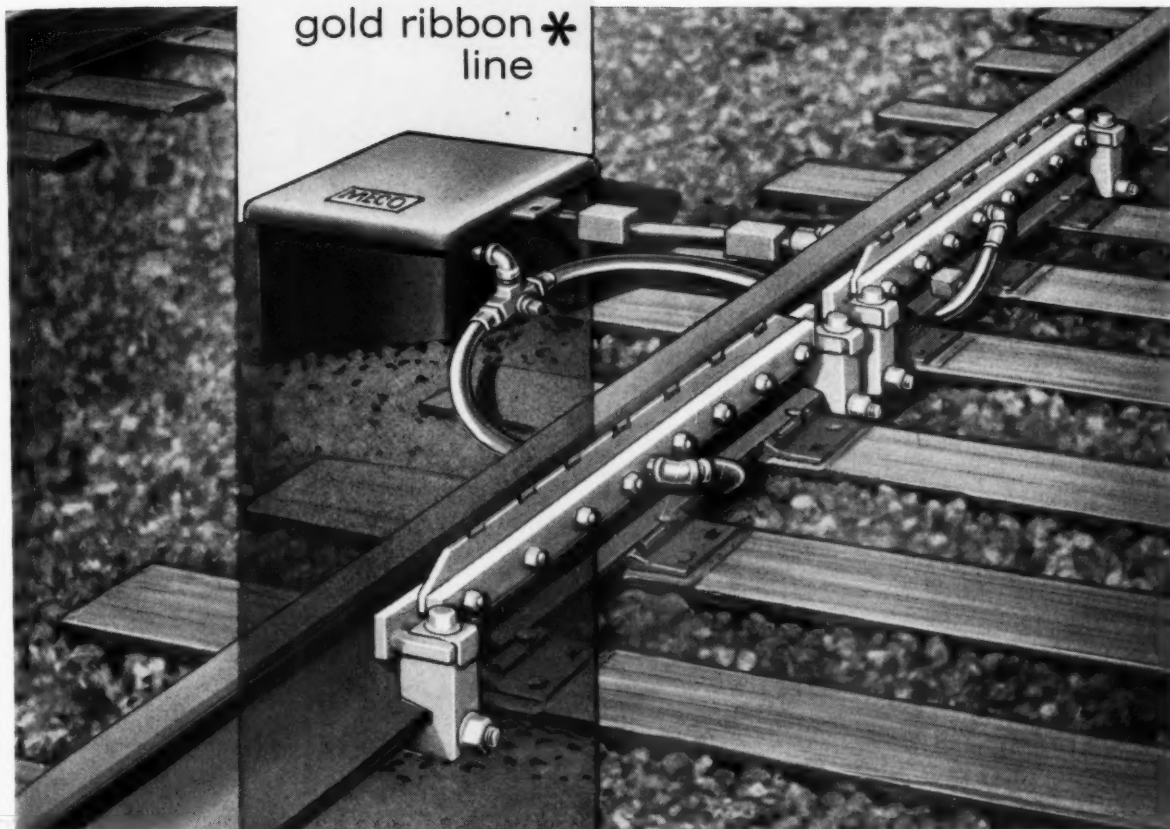
Competition between territories has been a potent factor in boosting production rates. Where there is a need to upgrade the quality of the work done it would seem that competition would be equally potent in helping to bring about the desired improvement. Any track man who knows that the quality of his work is to be compared with that of his colleagues will spare no effort in striving to make a good showing.

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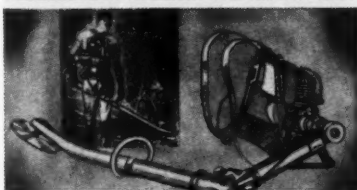


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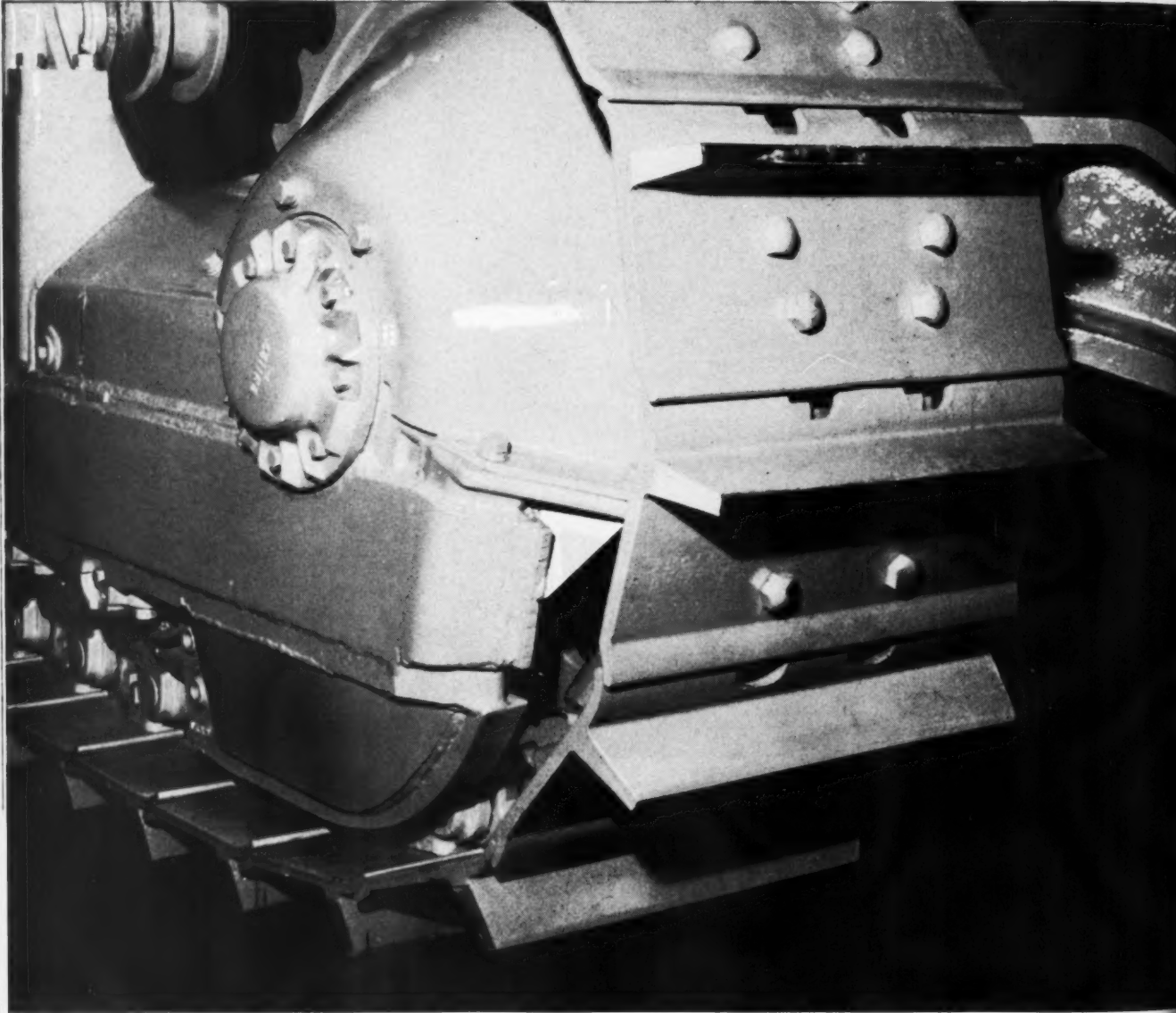
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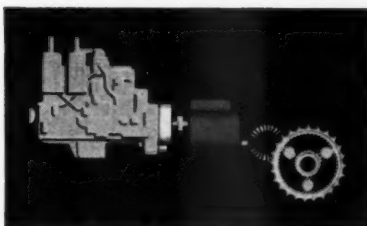
The engine in the new D9G delivers 385 flywheel horsepower. That's 100 more horsepower than the first D9 introduced five years ago!

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Torque divider power shift transmission... massive heavy-duty undercarriage... and power train with built-in ruggedness for long life.

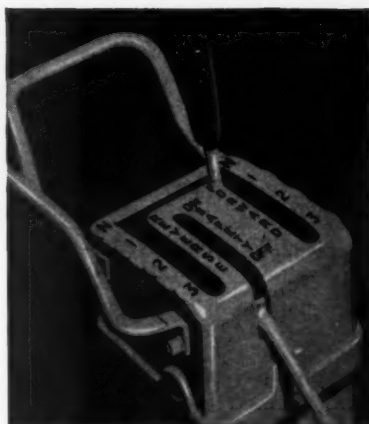
What else is new? Matching the D9G is a full line of attachments—all designed to help this new tractor really put out on the toughest big jobs.

CAT D353 ENGINE AND MATCHED POWER TRAIN This engine, rated 385 HP (flywheel) at 1330 RPM, has been proven—and proven again—over thousands of hours on the roughest jobs. Its 6.25" x 8" six-cylinder design now incorporates *controlled turbocharging* and aftercooling (found only in the D9G among crawler tractors), assures more efficient use of fuel, increases maximum torque and provides fast engine response over a wide range of operation. Shroud-mounted fan reduces air recirculation; torque limiting clutch saves on fan horse-



power. Plus: exclusive Caterpillar fuel injection system, twin dry-type air cleaners, oil-jet-cooled pistons, "Hi-Electro" hardened cylinder liners and crankshaft journals.

The new power train includes three major advances: *new oil-cooled steering clutches and brakes, new planetary final drives, and a time and cost saving common lube system.* The new spring-engaged, hydraulically-released steering clutches need no adjustments... have a proven longer service life. New, planetary final drives increase gear reduction ratios from 8.8:1 to 18:1, reducing torque load on all power train components. A common system cools and lubricates torque divider, transmission, bevel gear, steering clutches and brakes. This means one service point... one type of oil. The entire power train of the big new D9G has



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PROVEN TORQUE DIVIDER POWER SHIFT This exclusive Caterpillar design feature—standard equipment on the D9G—combines the efficiency and snap of direct drive with the load-matching and anti-stall characteristics of torque converter. A single lever gives the operator finger-tip control of his machine. It adds up to fast cycle times and greater efficiency. You get more out of the machine *all day*.

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New cable controls with larger clutch, brake and drum capacities—hydraulically boosted... new hydraulic controls in nine arrangements... special cushioned pushing equipment... angle, straight and U dozers, cable or hydraulic... rippers... scrapers... and others.

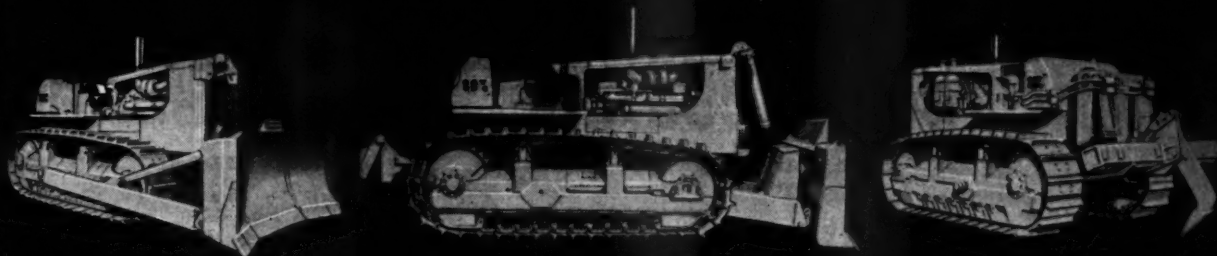
To prove the D9G's productive capabilities on your job, talk to your Caterpillar Dealer.

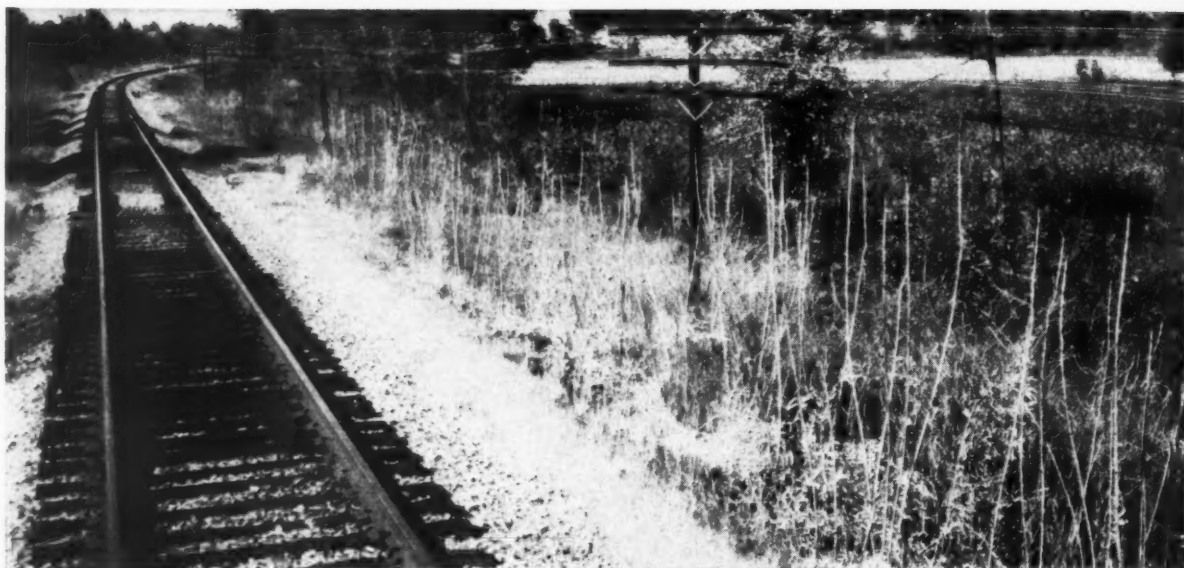
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Where tough perennials are a problem—This test plot was sprayed just once, with Du Pont Trysben® 200, over a year ago to control bindweed. Attacking through leaves and roots, "Trysben" 200 provides efficient control of other deep-rooted perennial broad-leaf weeds such as Canada thistle, leafy spurge, bur ragweed, Russian knapweed and woody vines such as honeysuckle and kudzu.



For brush that's hard to reach with sprays—Here's the easiest way ever to "spot-control" brush. New Du Pont Dybar® fenuron weed and brush killer comes in easy-to-use pellets for convenient and economical brush control. Brush on this fence row was killed by simply throwing "Dybar" pellets at the base of the brush. No other equipment required—but a tablespoon for measuring.

Solve tough weed and brush problems with Du Pont Chemicals especially designed to do the job

Du Pont weed and brush control chemicals are available to handle most any type of problem . . . easy or special ones such as those de-

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EPOXIES

New, versatile tool for many railroad jobs

Here is a substance that is rapidly gaining attention in and out of the railroad field for its many remarkable properties. So effective is it as an adhesive that test specimens usually fail in one of the materials bonded together, not at the joint.

It is also said to have an excellent combination of tensile strength, hardness, flexibility, durability, abrasion resistance,

waterproofness, dimensional stability under changes in temperature, minimum shrinkage, and resistance to weathering and the action of chemicals.

It's a relatively new family of synthetic plastics called epoxy resins. Many applications for them have already been found in railroad maintenance of way and structures and others are doubtless on the way.

● Researchers at the AAR laboratory in Chicago were curious to know whether it would be practical to "glue" rails directly to concrete ties. To find out they fastened a length of rail to a concrete tie using a plastic resin, and placed the assembly in the laboratory's repeated load machine. After 4,335,000 cycles of stress reversal the test was discontinued. The joint was still intact.

The adhesive used in this test was a formulation based on a relatively new family of synthetic plastics known as epoxy resins. Aside from their outstanding qualities as adhesives or bonding agents, epoxy systems have other physical properties that are causing railroad maintenance men, especially those in the bridge and building department, to regard them with increasing interest.

Already they are being used for patching and grouting old masonry structures, for bonding new concrete to old, as a waterproofing or protective coating for concrete and other materials, as a material for patching or topping floors or platforms subject to heavy wear or the action of acids or alkalis, and in constructing shear keys for precast, prestressed concrete spans.

Most epoxies are liquids and are

known as two-part systems. One part is the basic epoxy resin which is manufactured from a derivative of coal tar known as bisphenol and a material, known as epichlorohydrin, which is produced during the manufacture of synthetic glycerin.

The other part of the two-part system is known as the curing agent or hardener, or is sometimes referred to as a catalyst. When the basic epoxy resin is mixed with the hardener or curing agent a chemical reaction takes place which generates heat and which may be accelerated by the application of heat. In this curing process the product sets to form an infusible mass which does not return to the plastic condition

when reheated. It has, therefore, been converted into a thermosetting resin.

The physical properties of cured epoxies may be varied over a wide range depending on the curing agent, as well as modifiers or other additives that may be used. As already indicated these properties include excellent adhesion. This quality is demonstrated when structures formed by bonding concrete to concrete, wood to wood, or wood to steel, are broken. The break always occurs in the concrete or wood and not in the joint.

Combination of properties

Epoxies are also said to have an excellent combination of tensile strength, hardness, flexibility, abrasion resistance, durability, waterproofness and resistance to weathering. Shrinkage while curing is very low. They are also resistant to attack by most of the common solvents and chemicals. Finally, they have a low coefficient of thermal expansion, a quality that has advantages when they are bonded to materials, such as concrete, various metals and wood, whose coefficients of expansion are also low.

Some of the curing agents used

**Epoxies
at work
on the
railroads**

Turn page; also see articles
beginning on pages 29 and 32.

Epoxies at work on the railroads

Repairing a failed concrete floor

In a Rock Island building at Chicago heavy traffic on the first floor outside the elevator caused the concrete topping under the asphalt tile to break down. Repairs were made by chipping out the old concrete and replacing it (below) with an epoxy material known as Clinco-Crete patching compound made by the Clinton Co., Chicago. Why an epoxy? Primarily for adherence, says a Rock Island engineer.

(Circle 100 on TIME-SAVER card, page 51)



Building up broken terra cotta blocks

The Santa Fe-owned Railway Exchange building at Chicago is covered on the Jackson and Michigan Boulevard sides with terra cotta blocks. Several years ago, during a tuck-pointing job by the Structural Waterproofing Co., Barrington, Ill., it was found that some of the blocks were broken or cracked. Where pieces had broken off the blocks were built up with an epoxy material. Cracks were filled by a clear epoxy.

(Circle 101 on TIME-SAVER card, page 51)

with epoxies will cause the curing procedure to take place at room temperature. With others an elevated temperature is required. In either case the rate of cure is enhanced by the application of heat. For example, an epoxy system that will reach its ultimate strength in two to four days at room temperature will cure to the same degree in about 20 minutes at 200 deg F. This property can be of significance on projects involving the use of an epoxy formulation for an application, such as the shear keys between concrete girders, where quick setting is necessary to permit restoration of traffic.

Mix in limited quantities

Most epoxy systems made with curing agents designed to set at room temperatures have a pot life ranging from one to eight hours. The reaction cannot be slowed down or stopped by the use of thinning agents. For this reason manufacturers of epoxies recommend that the mixing be done only in quantities that can be used immediately.

The preparation of epoxy systems is much more than simply a matter of mixing the epoxy resin and the curing agent. Other substances are added depending on the desired properties of the cured resin, and the function that it is to serve and to facilitate handling and application.

Modifiers and diluents

For example, a substance known as a resin modifier may be added to improve the resistance of the cured resin to impact and to changes in temperature. Other substances, known as reactive diluents, may be used to reduce the viscosity of the formulation while at the same time maintaining as nearly as possible the original properties of the cured resin.

The most effective reactive diluents are said to be low-viscosity epoxy compounds. These not only reduce the viscosity of the formulation but are said to contribute better wetting and penetrating qualities and to permit the use of larger amounts of fillers.

Fillers comprise, in fact, a very important ingredient of epoxy systems. By adding to the volume of the material they help to reduce the cost. By imparting a mortar-like consistency they produce a mixture that can be applied by trowelling. In serving these purposes they are comparable to sand when used as an aggregate in portland cement mixes.

Success depends on fillers

In addition, fillers are used to modify properties of the cured and uncured formulations. Manufacturers state that the success of an epoxy system may depend on the judicious use of fillers. Advantages to be gained through their use include longer pot life, reduced heat generation, less shrinkage during the curing period, control of flowability, reduction of the coefficient of thermal expansion, and increased thermal conductivity.

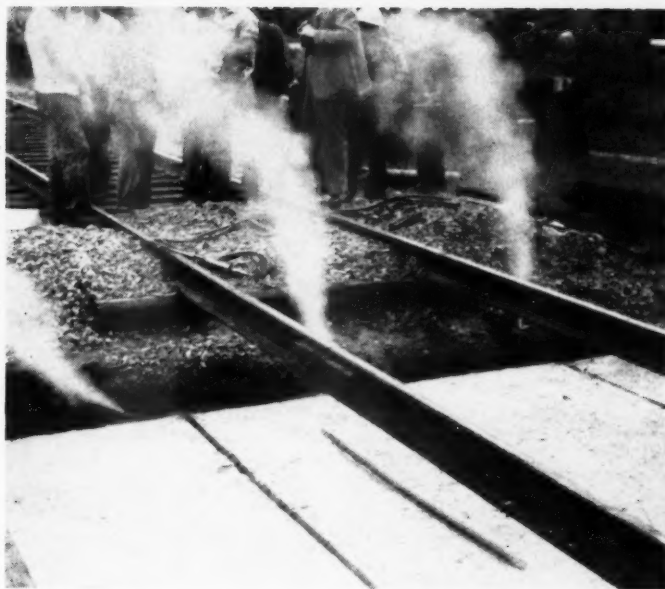
The choice of fillers for a specific mix depends largely on the function to be served by the formulation. Adhesives are said to be improved



Reinforcing poles, piling, other timbers

An epoxy resin formulation, known as OsmoWeld wood replacer compound, is available for strengthening marginal and sub-marginal areas of wood members. Made by Osmose Wood Preserving Company of America, Inc., Buffalo, N. Y., it is packaged in disposable cardboard tubes with plastic nozzles designed to permit application by plunger-type caulking gun. Photo above shows use of material to fill cavity in pile.

(Circle 102 on TIME-SAVER card, page 51)



For shear key

Keyways of prestressed concrete girders on Burlington were filled with epoxy grout. Steam fed through copper tubes (above) speeds cure. Bottoms of keys were sealed with strip of sponge rubber (right), and ends were closed with epoxy paste (below.)



considerably through the use of moderate quantities of alumina and asbestos fiber. If the formulation is to be used as a flooring compound, a filler consisting of dry silica sand, quartz sand, flint shot or carborundum grit may be used. If desired, marble, brick, dry cement, or other masonry dust may be added to match color with the surface to be repaired. Or pigments such as iron oxide may be used.

Making epoxy mortars

Epoxy mortars for filling large cracks or other voids in old concrete may be produced by using fine fillers such as silica or quartz sand. For sealing hairline cracks an unfilled liquid epoxy compound would be used. A coat for bonding new concrete to old or for waterproofing a concrete surface would also consist of a clear formulation. Depending on their consistency epoxy formulations may be applied by brushing, spraying or trowelling.

There are about six companies in the United States that manufacture basic epoxy resins. A considerably

larger number of companies, known as formulators, are in the business of producing formulations of epoxies from the basic resins, adding the diluents, modifiers, fillers, etc., that may be needed for specific applications.

How packaged

The epoxy resin and the curing agent are, of course, packaged separately or in separate compartments. If the formulation involves the use of sand or other aggregate some manufacturers will package it with the resin, others will package it as a third component, while others will merely include instructions for the proper grade of aggregate.

All manufacturers are agreed on one point, namely, that epoxies will live up to the claims made for them providing (1) that the proper formulation is used for the particular application, and (2) that proper attention is given to the cleaning and preparation of the surface to which the material is to be applied.

In view of the claims made for them, epoxy formulations would ap-



Three photos above courtesy American-Marietta Company

Epoxies—Tool for many railroad jobs *cont'd*

pear to have many applications in the railroad field, particularly in connection with the construction and repair of masonry structures. It is interesting to note, however, that their first known application in the railroad field was in the track structure as a means of producing continuous rail by bonding the joint bars to the rails.

Bonds tie plates to ties

The formulation used for this purpose is a two-part system known as Bondarc VI, and is manufactured by the Rail Joint Company. This company has also developed an epoxy compound, known as Bondarc TP, for bonding steel tie plates to wood ties. The procedure is to bond the tie plate to the tie after the tie has been adzed and bored but before it is given preservative treatment. Laboratory tests are said to have shown that the material produces a bond between the tie plate and the tie that exceeds by 250 per cent the highest known loads imposed by a rail in actual service. A test installation is now under observation on the New York Central.

The potential advantages of epoxy formulations for various railroad applications have been recognized by members of the AAR research

staff and also by several AREA committees. A report containing formulas for various applications was included in the 1961 report of the Committee on Wood Bridges & Trestles (AREA Bulletin, Vol. 62, No. 562, January, 1961). An appropriation has been included in the AAR research budget for 1961 to finance a study of epoxies. This work, explains Freeman Drew, assistant research engineer structures on the AAR staff, will be carried out with the cooperation of several AREA committees.

Uses to be investigated

For the Committee on Wood Bridges and Trestles the research staff expects to investigate the use of epoxies for protecting pile cut-offs and for repairing checks and splits in timbers. The latter tests, says Mr. Drew, will be made with full-size bridge stringers. The purpose will be to determine the extent to which an epoxy material, when forced into checks and splits, will restore the strength of the members.

For the Committee on Masonry a study will be made of the effectiveness of epoxy formulations when used as protective coatings for concrete car-washing platforms. In this study the research staff will col-

laborate with an AAR member road in applying an epoxy coating to a car-washing platform on that road. For the same committee the research staff will study the effectiveness of epoxies for bonding new concrete to old concrete.

In still another aspect of the AAR investigation, which will involve both the Iron & Steel Structures committee and the Masonry committee, studies are expected to be made of the effectiveness of epoxies as protective coatings for steel plates and as a waterproofing material for steel, concrete and timber decks.

Epoxy bonded bridges

A project to investigate the ability of epoxies to prevent slippage of bolted steel joints is to be sponsored by the Research Council on Riveted and Bolted Structural Joints. In fact, since epoxies were first used structurally in fabricating airplane assemblies, the suggestion that they may ultimately be used in fabricating steel bridges is not considered too farfetched. A step in this direction was indicated by recent tests at the University of Arizona Engineering Experiment Station which are reported to have demonstrated the feasibility of using an epoxy to bond concrete to steel to form a composite bridge beam.

The study of epoxies for railroad applications, says Mr. Drew, must necessarily give consideration to such properties as their resistance to weathering, fatigue and creep, the latter having to do with the ability to sustain loads over a long period of time. Other factors that need to be investigated, he believes, are the degree of surface preparation required and the effect on epoxies of the temperature prevailing at the time they are applied. Normally it is not considered feasible to make applications when the temperature is below about 50 deg.

The statement has been made that the applications of epoxies in the maintenance of way and structures field are limited only by the imagination of the people using them. Some of the uses to which epoxies have been put to date are pictured and described on these and the following pages. Additional uses will doubtless be found as railroad men become more familiar with their capabilities.

Precautions recommended when handling epoxy materials

Manufacturers of epoxy resins caution that prolonged or frequent contact with materials used in epoxy systems may cause dermatitis for some individuals. However, the Jones-Dabney Company, a manufacturer of basic epoxy resins, asserts that skin irritations can be avoided or held to a minimum by the use of proper equipment and handling techniques. The following protective measures are offered by this company as having been effective in reducing the incidence of dermatitis:

- (1) Reasonable care in preventing skin contact and regular washing of hands, arms and face with warm soapy water.
- (2) Effective ventilation to prevent the accumulation of vapors of the volatile amines and reactive diluents.
- (3) Storage of materials in closed containers fitted with spigots and valves.
- (4) Use of disposable containers for mixing the materials to keep cleaning of contaminated equipment to a minimum.
- (5) Solvents for clean up must be used with extreme care since contaminated solvents are a prime source of irritation.
- (6) Use of rubber gloves and protective clothing is helpful, but they should not be worn after they have been contaminated.

Epoxies at work on the railroads

Prestressed concrete

bridge has . . .



GIRDERS, their upper surfaces already given two coats of epoxy waterproofing, were assembled into spans and bolted together. After the ends had been blocked, epoxy grout was poured into the keyways. Heating cables in place were not used but grout cured in 1 hr 45 min without them.

. . . Epoxy shear keys, waterproofing

In replacing two 33-ft deck-plate spans with two precast prestressed-concrete spans, the Rock Island used epoxy formulations in two different applications. One was in the grout applied in the shear keys between adjacent girders forming the individual spans. The other was the waterproofing applied to the top and end surfaces of the girders, which was brushed on in the form of a primer coat and a finish coat.

● What is thought to be the second* prestressed-concrete railroad bridge built with epoxy shear keys and the first to be waterproofed with an epoxy formulation recently went into service on the Rock Island. This bridge, No. 2239, is located near Letts, Iowa, on the road's Davenport-Eldon line and carries a single track on a 1-deg curve over Indian creek.

The new structure is comprised of two 33-ft 2-in precast prestressed-concrete spans with a ballasted deck. They replace two ballasted-deck 33-ft deck-plate girder spans which had become badly corroded from brine drippings.

In Rock Island's new bridge, each of the spans consists of four hollow-box prestressed-concrete girders. The

width, depth, wall thickness and prestressing strand locations incorporated into the design of the girders is the same as that adopted by the American Association of State Highway Officials. These hollow-box girders can be obtained at many commercial casting yards without extra forming costs. The Rock Island had the girder sections fabricated to conform with the AREA tentative specifications for prestressed-concrete structures, designed for Coopers E-72 loading plus impact. In this design, equal load distribution to each girder was assumed.

The girder sections are 3 ft wide by 2 ft 9 in deep and 33 ft 2 in long and were cast with shear-key slots in the adjacent sides. Reinforced-concrete ballast-retainer curbs were cast on the outer girders after the prestress cables of the girders had been released. The girders were fab-

ricated at the Memphis, Tenn., plant of the American-Marietta Company and shipped by rail to Letts.

The road's original plan called for setting the four girders of each span into final position separately, then bonding them together with an epoxy mix, using two electric heating cables in each keyway to hasten the curing. However, with this plan only one span could be changed out in a day because of train traffic. For this reason it was decided to preassemble each span at a site in town, including application of the shear keys. They could then be handled as complete units and both erected in one day.

After the girders had been unloaded at a level area in town their top and end surfaces were brushed with two coats of an epoxy waterproofing formulation. The first coat was a low-viscosity primer to get penetration. It was formulated by volume of 100 parts of Epi-Rez 5071 epoxy resin and 60 parts of Epi-Cure 855 curing agent. The finish coat consisted of 100 parts of Epi-Rez 510 (with 8 per cent Cabo-Sil to enable the mix to stand on vertical surfaces) and 60 parts Epi-Cure 855. The waterproofing coats were formulated by the Clinton Company, Chicago.

The girders forming each span

*The first was a 29-ft span installed by the CB&Q at Rochelle, Ill., in May 1960.

Epoxy shear keys, waterproofing *cont'd*



EPOXY RESIN and curing agent are thoroughly mixed before masonry sand is added. This formulation will give molecular and physical bond. Because of short pot life, only small quantities are mixed at a time.



KEYWAYS of adjoining girders were given an epoxy prime coat to insure bond of the epoxy grout. Pressure-sensitive sponge-rubber tape was affixed below the keyways to prevent waste of the grout.

Gives reasons for using epoxies

"There are several reasons why we used epoxy grout for the shear keys on this bridge," explained J. R. Williams, Rock Island's assistant engineer bridges. "First, it gives us a higher strength and better bond than any other material we now know. Also it should be more durable than a cement-grout shear key. Finally, it is the only satisfactory material that can be used to bond prestressed-concrete girders together in the track in so short a time.

"Of course," he continued, "we could have achieved equal load distribution to the girders by the use of transverse post-tensioned rods, but we don't feel that this would be economical from a maintenance standpoint. The joints between girders would leak and hasten deterioration, a situation we cannot afford to have with hollow prestressed-concrete sections. The epoxy shear keys prevent leakage.

"The epoxy waterproofing is more economical to apply than the conventional membrane type," Mr. Williams added. "With epoxies, the girders can be waterproofed at any time after the concrete is cured prior to assembly into spans. With membrane waterproofing, we'd have to do the work after the complete span had been assembled. If the girders were erected in the bridge separately, the application of membrane waterproofing would make it necessary to keep the track out of service a longer period of time."

were then set with their ends on steel beams to insure that they would form a level plane. Next, the girders in each span were bolted together by three bolts, 1¼ in. in diameter by 12 ft 6 in long, inserted into precast holes. Before the bolts were applied, however, a clear epoxy was brushed on the keyway surfaces. The purpose was to prevent the epoxy resin from being drawn out of the shear-key grout that would be applied later. In addition, pressure-sensitive foam-rubber tape was affixed to the girders below the keyways to prevent any waste of the epoxy grout because of possible warp in the girders.

Has short pot life

After each span had been assembled and bolted, the epoxy-grout materials for the shear keys were mixed. This formulation, again mixed by volume, consisted of 100 parts of Epi-Rez 510 epoxy resin, 60 parts of Epi-Cure 855 curing agent, 7 parts of Epi-Cure 87 accelerator and 600 parts of masonry sand. The basic manufacturer of these epoxy materials is Jones-Dabney Company, Louisville, Ky. The resin and curing agents were thoroughly mixed before the sand was introduced. Since these materials harden in the pot in a relatively short time, they were mixed in small quantities at a time, usually on the basis of ½ gal of resin.

While the prime coat was still wet in the keyways, the grout was poured into the keys. Because of their unfamiliarity in working with these materials, the men required two hours for completely filling the keyways of the first span. However, they soon became more proficient and required only 45 min to fill the keyways of the second span. The grout material gelled in the keys in 1 hr and 45 min. Although the heating cables were installed, they were not considered necessary because sufficient time for curing was afforded by bonding the girders out of track.

The working force in the yard consisted of a B&B foreman and five men. Two men mixed the materials and the others placed them.

As assembled, each span weighed 50 tons. Using two locomotive cranes they were loaded on flat cars and moved to the bridge site where

they were unloaded on cribbing beside the existing bridge. For this work and the handling of the girders, the crew was assisted by another force consisting of a foreman, two crane operators and three men.

Because of the difference in depth of the old steel and the new concrete spans, the latter were supported on reinforced-concrete raiser blocks. These were precast and had been delivered to the site in advance.

Quick change out

To expedite the replacement of the structure, the running rails were squared up with the span lengths. Also, since the existing spans had a deep ballast section, it was decided to waste this material before attempting to lift them.

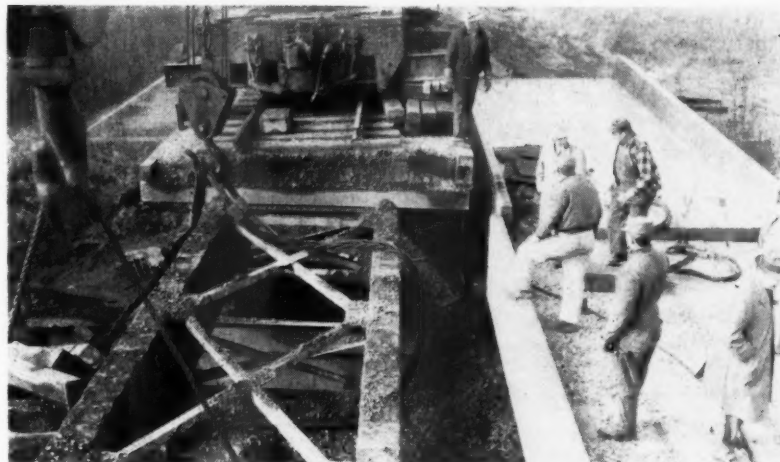
As soon as the operating department had taken the track out of service, the track over one span was removed. This included the rails, ties and ballast and also the deck timbers. The old span was then lifted out by the two cranes and set to one side, after which the bridge seats were cleaned off, grout applied and the raising blocks set and doweled in place.

When the blocks had been properly positioned, four neoprene bearing pads, 1 in thick, were placed on each block, one under each girder. Next, the new span was lifted into place on the raising blocks, which were cast with end shoulders for laterally retaining the spans. Cross-ties were then placed, the rails laid and the track given a tentative raise on ballast.

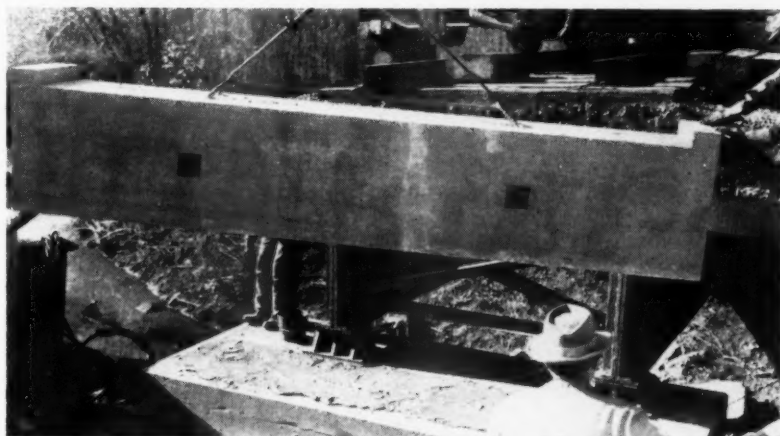
The same procedure was followed in setting the second span. A pre-molded joint filler was inserted between the spans. The track over the entire structure was then given a final raise and surface. The track was out of service 7 hrs. The removed steel spans were scrapped.

The Rock Island feels that it has an excellent bridge at Letts. It has proved to be more economical than a replacement in kind. If it had been replaced in kind, it is estimated that the cost would have been 25 per cent greater. A further advantage is that prestressed-concrete girders are shallower than comparable steel spans. The road is now working on plans for a prestressed-concrete-girder trestle, using 28-ft spans.

How concrete spans were installed . . .



TRACK and deck timbers over one span were removed and the old ballast was wasted. Two locomotive cranes then lifted out the old steel span and set it to one side, after which the bridge seats were swept clean and coated with a layer of grout.



RAISER BLOCKS, of reinforced concrete, were required because of the difference in depth of the old steel spans and the new concrete spans. These were precast with end shoulders and had been delivered in advance of the change-out.



NEOPRENE PADS were placed on each raising block, one under each girder. The new concrete span was set in place and the track temporarily restored. The same procedure was followed for the second span, after which the track was surfaced.

Epoxies at work on the railroads

The damage
and how it
was repaired



CRACKS were present in the top surfaces of all the piers and pedestals.



DETERIORATION of concrete showed up in small cracks in vertical faces through which calcium carbonate was leaching.

Clinchfield bonds, patches, coats with



Broad River bridge, built in 1908, is 1360 ft long

The Broad River bridge carries a single main track of the Clinchfield over a structure 1,360 ft long, which was built in 1908. Maximum height from base of rail to water is 160 ft.

The superstructure is comprised of 12 -70-ft deck plate girders, 8-40-ft deck plate girders and one 200-ft deck pin-connected truss. The supporting structure consists of 2 two-leg bents, 8 four-leg towers and 2 four-leg A-frame towers.

The masonry foundation consists of 2 concrete abutments, 36 concrete pedestals at towers and bents and 8 concrete piers at A-frames. The concrete was made from portland cement, local sand and coarse aggregate, the

latter being of poor grade granite bordering on schist in sizes up to 4 in.

All footings were mixed 1:3:6, all shafts 1:2:5 and all tops, including the bridge seats, 1:2:3. The concrete in the abutments, and in bents No. 1 to 9 and No. 20 to 22, inclusive, is unreinforced. The concrete for bents No. 10 to 13 and No. 18 and 19 has Clinton wire cloth on the shaft faces. The concrete for bents No. 14 to 17 has reinforcing of $\frac{3}{4}$ -in bars on 9-in centers placed 4 in from the face of the shafts. Anchor bolts of $1\frac{1}{2}$ in diameter were placed in 4-in diameter wrought-iron pipe sleeves. The latter extended a considerable distance into the concrete and were not filled with grout.

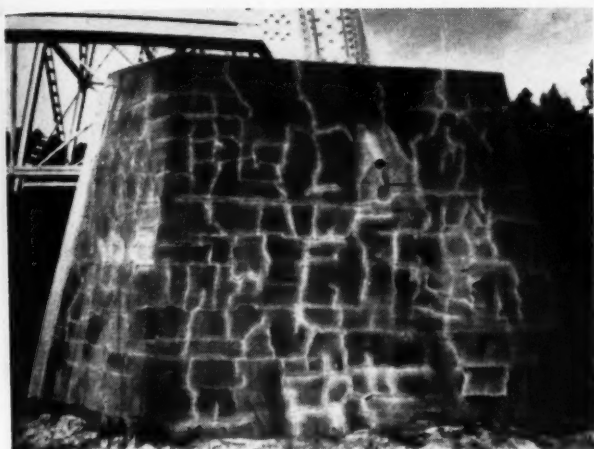
● "Time and experience will, I am sure, either prove or disprove our confidence in the permanence of such materials for the repair of old and badly deteriorated concrete." So said J. M. Salmon, Jr., chief engineer of the Clinchfield, concerning his road's use of epoxy resins when repairing the piers and pedestals of a bridge constructed in 1908 over the Broad river in North Carolina.

State of deterioration

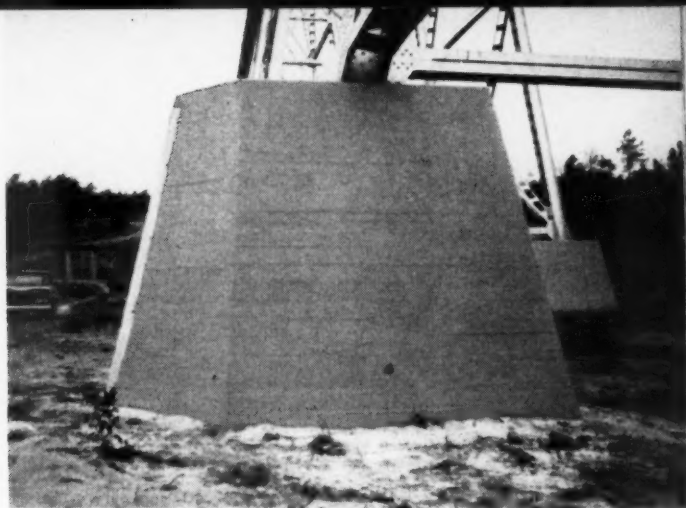
When the concrete piers, pedestals and abutments of the bridge were constructed, the concrete practices in use left much to be desired when compared with those in effect today. As a result small cracks had developed in both the top surfaces and vertical faces of this masonry. Also, calcium carbonate had leached out from within to grow in a stalactite formation on the exposed surfaces.

On the eight piers, which are approximately 30 ft high, the concrete had spalled off from the vertical surfaces and the tops had opened up in crack formations ranging up to $1\frac{1}{2}$ in. in width. In general, these all radiated outward from the anchor-bolt locations to the edges of the masonry. Some cracks, well open at the top, extended down the masonry face 4 ft or more.

A close inspection revealed that the space between the anchor bolts



OLD CONCRETE was washed with muriatic acid, flushed with water and sandblasted, then cracks were opened up and air cleaned.



REPAIRED PIER has all cracks sealed. Small holes were drilled into deep cracks and epoxy resin injected to refusal.

epoxies in repairing old concrete

and the walls of the wrought-iron pipe sleeves around them had not been filled at the time of construction. As a result they were filled to the top with water. It was this condition which, over the years, had brought about the major masonry deterioration. Normally, in this climatic area, low temperatures of long duration are uncommon. However, during the winter of 1958-59 there were long periods of below-freezing temperatures following long rainy periods which aggravated the masonry deterioration.

Many schemes for rebuilding, repairing or strengthening this masonry were investigated. These studies led to the conclusion that epoxy formulations might prove both effective and economical in making the repairs, and the decision was made to proceed on this basis.

Preliminary to making the repairs, a road was cut to the site, all brush was cleaned away from under the structure and a fresh-water pond was excavated by a bulldozer. The pond was about 90 ft above river level. It was lined with a sheet of plastic 28 ft wide by 100 ft long, and was used to store water for cleaning purposes.

Masonry cleaned thoroughly

All exterior masonry was washed with a solution of muriatic acid, then flushed with clear water from

the pond. Following this, the masonry was sandblasted. All large cracks were blown out several times, using compressed air, while the other work was progressing. All small cracks were opened to a depth of at least $\frac{1}{4}$ in, using air-operated chipping hammers to form a V-groove. The loose material was removed from the exposed edges of the larger cracks.

All cracks in the vertical faces were repaired by troweling into the V-grooves a mixture of epoxy resin and especially prepared fine aggregate in a consistency similar to plaster. Where large cracks were encountered and there was the possibility of the mixture not reaching the full depth of the opening, a small hole was drilled through the repair material after it had set up, and epoxy resin was forced into the hole until refusal. This hole was then sealed with the epoxy-aggregate mix.

Where large areas had spalled and deteriorated on the vertical surfaces of the piers, they were cleaned to sound concrete and painted with an epoxy material for bonding purposes. Thin coats of Pre-Mix Embeco were troweled over these areas, using epoxy bonding material between each coat, until the original surface dimension had been reached.

After the vertical faces had been repaired, the filling of the top-surface cracks was begun. A liquid epoxy, which was the same as that used with the aggregate, was poured

into the cracks and into holes drilled from the top. This material was reported to have good wetting and penetrating qualities and, when poured into the cracks and drilled holes, filled the small voids.

As the filling of these cracks and holes progressed to the point where they assumed some width, aggregate was inserted first in small proportions and then, as the top surface of the masonry was approached, in full proportions to finally seal them at the top. The top then received a trowel coat of epoxy and aggregate mixed to plaster consistency.

Attention was then given to the pipe sleeves surrounding the anchor bolts. These were filled with a mixture of epoxy and aggregate having a consistency similar to that of thick cream.

The final treatment was a two-coat application of epoxy-resin paint. This was well brushed on the exterior surfaces.

Epoxy is two-part type

The epoxy materials used took an initial set in from 30 to 60 min. Hence, only small quantities could be used at a time. The epoxy material used was two-part type with the liquid epoxy resin and the curing agent coming in separate containers. Since epoxies are not compatible with water or dampness precautions had to be taken to make certain that



PEDESTALS were given the same repair treatment, then all exterior concrete surfaces, both vertical and horizontal, were brushed with two coats of epoxy-resin paint.

How Clinchfield used epoxies *con'td*

the cracks and surfaces were dry before using the resin. Large sheets of heavy-gauge plastic were used to protect and keep the tops and exposed areas of the masonry dry between applications of the materials.

It was desirable that the work be done in dry weather. The work was started in August by regularly assigned B&B forces under the direc-

tion of the supervisor of B&B. However, before work on the entire structure could be completed, cool and damp fall weather set in. The working period was prolonged until November 11 by using banks of infrared lights to heat and dry the exposed surfaces. This proved too slow and expensive so the work was stopped. Repairs to piers and pedes-

tals of bents Nos. 16 to 22, inclusive, will be done this summer.

In 1960, work was completed on the pedestals and piers of bents No. 1 to No. 15, inclusive. The following materials were used on this portion:

Epoxy resin filler with aggregate	45 units
Epoxy resin filler less aggregate	140 units
Epoxy resin bonding agent	8 gal
Epoxy resin protective coating	220 gal
Pre-Mix Embecco	5,000 lb

The epoxy materials were furnished by Permagile Corporation of America, Woodside, N. Y.

Costs to date are estimated at \$1.40 per sq ft for materials and \$1.45 per sq ft for labor. Commenting on these costs, Mr. Salmon said:

"As this was the Clinchfield's first attempt to make masonry repairs using epoxy materials, the men were trained slowly but correctly. We feel that the remaining work will be progressed at a somewhat lower labor cost."



DETERIORATED CONCRETE was chipped out and cleaned by compressed air while epoxy materials were mixed.



MIXTURE of epoxy resins, curing agent and pea gravel is dumped into holes, squeegeed, then troweled smooth.

Sets up test of epoxy surfacer on storehouse concrete platform

The Milwaukee Road has a system storehouse at Milwaukee, Wis., which is served for the full length on its trackside by a concrete platform. The latter, built in 1957, is 6 in thick and about 30 ft wide, placed on an earth fill. Fork-lift trucks use this platform constantly when loading cars with heavy shipments. Some surface spalling has taken place, presumably from the application of salt on ice during winters and from the dropping of heavy loadings. In addition, wide cracks for the full depth of the slab developed at several locations, a few breaking out at the track edge into wide gaps.

The railroad decided that this plat-

form would be suitable for making a test on the use of epoxies. For this work it selected Eurycon-X Floor Surfacer and Patching Compound as manufactured by Associated Allied Industries, Inc., Milwaukee, Wis. In addition to the epoxy and curing agent components, this material also included a third component which is said to add to the hardness of the repair materials.

The three components were mixed in equal parts in a large container, then pea gravel was introduced in the ratio of 8 parts gravel to 1 part epoxy mix. This mixture was then poured into the cracks, which first had been chipped out to reach sound concrete. The com-

posite material was then leveled slightly with a squeegee. When it had begun to gel, the surface and edges were troweled lightly to conform with the adjacent platform surface. This material set up over night but heavy fork-lift traffic was kept off of it for four days.

For resurfacing the spalled spots, which varied from $\frac{1}{8}$ to $\frac{1}{4}$ in deep, the three epoxy components were again mixed in equal proportions but strained torpedo sand was used instead of the gravel. This aggregate was mixed at the rate of 8 parts sand to 1 part epoxy mix. The spalled areas were swept clean with a stiff-bristle brush after which the mix was troweled smooth.

Big Savings from M/W radio on the EJ&E

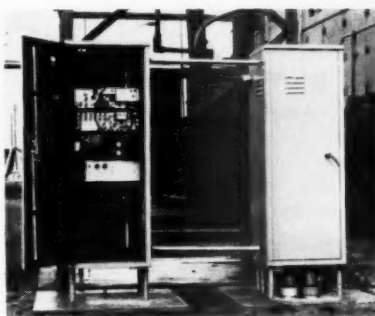
As the result of the recent installation of a two-way radio network maintenance-of-way supervisors on the Elgin, Joliet & Eastern's Gary division are finding out what it means to have instant communication with their foremen and other men in the field. Whether it's a matter of changing work assignments, of shifting men or equipment from one point to another to handle an emergency, or of reporting the sudden illness of an employee in the field, they are finding that on-the-spot communication saves time and money.

● From the time R. V. Dangremond, roadmaster of the EJ&E's Gary division, arrives on the job each morning, whether he's in the office or in the field, he is practically always in a position to converse with any of his foremen regardless of where they may be.

The same statement applies to the three track supervisors on this division, B&B supervisor, welding supervisor, work equipment supervisor and to the signal supervisor. It has been made possible as a result of the installation early this year of a two-way radio system.

As a result, the officers not only know where each gang is working and what it is doing, but they can get in immediate contact with its foreman. In the event that more urgent work needs attention, the foreman can be directed immediately to send a number of men, or his whole gang if necessary, to a different location. On the other hand, if unforeseen work conditions arise, or a machine breaks down, the foreman can acquaint his superior with the facts without delay.

The EJ&E had been studying the practicability of using radio for its M/W forces for a number of years. Ever since 1955, when the AREA Yards and Terminals committee presented a report on the use of radio for expediting yard-switching operations, maintenance officers of the EJ&E have been convinced that radio communication was a necessary tool for its maintenance forces.



The need for instantaneous communication between supervisors and their foremen applied especially to the road's Gary Division. As A. C. Johnson the "J's" chief engineer, explains it: "The Gary Division serves heavy industries in the Gary, Hammond, Whiting and South Chicago areas. Our largest business is with several steel plants in this area. In the steel-making industry, empty and loaded cars must flow in and out of the mills continuously. If they don't, some of the operations could be delayed and we would hear about it.

"On the Gary Mill division" he continued, "we have about 210 miles of track and about 1,700 switches to maintain, and it is extremely important that we keep those switches operable. On the South Chicago division we have approximately 800 more switches and about 100 miles of track. In the Kirk-Calumet district, which includes Whiting and Hammond, we have approximately 900 switches and 115 miles of track.



ANTENNA for Kirk Yard base station was installed on top of existing floodlight tower. Transmitter apparatus (shown at left and in circle in photo above), was placed at base of tower.

With so many switches and so much trackage emergencies are bound to occur.

"Some of these emergencies are peculiar to a railroad serving the steel industry. For example, ingots or molds may fall off a car and derail it, tying up traffic until crews can get there to rerail the car and fix the track.

"Snow storms present another aggravating problem. Although we have used propane-gas, electric and pot-type switch heaters for years, a snow fall of six inches or more, when combined with high winds, may necessitate the hasty recruitment of a considerable number of extra laborers."

It was these conditions and problems that convinced the railroad that radio would be a useful tool in the hands of its M/W forces. There was some doubt, however, whether radio signals would be heard with clarity because of the many steel buildings, furnaces, cars, ingots, etc., through which the tracks

M/W radio on the EJ&E cont'd



COMMUNICATION is extremely flexible. Base station (left) can communicate with mobile units (above and lower right) and with Handie-Talkie units (upper right). In turn, they can communicate with each other. High-output speakers enable men to hear calls while away from their vehicles.

Radio network links division supervisors

were threaded. Working with engineers of Motorola, Inc., a trial installation of a partial radio system was made. When reception proved highly satisfactory, the EJ&E entered into contracts with Motorola for the installation and maintenance of a complete system for the Gary division.

The system is comprised of 2 base stations, 5 remote-control points, 17 two-way mobile sets installed on 15 trucks and 2 automobiles and 29 Handie-Talkie portable sets. This set-up permits practically instantaneous communication between every supervisor on the division and each of his field foremen. The system operates on a frequency of 161.550 megacycles. Each set is assigned its own call number.

One base station is at Kirk Yard and the other at South Chicago. Each consists of a transmitter-receiver with the antennae placed on top of existing floodlight towers, 90 ft and 50 ft high, respectively. Antennae of the high-gain type were used as this type gives greater transmitting and receiving distances with the same power.

The base station at Kirk Yard works with 60-watt power which has been found to give excellent results up to 25 miles for the mobile sets and up to 6 miles for the Handie-Talkie sets. The base station at South Chicago works with 25-watt power and gives reliable communications

over the desired area. The antenna at South Chicago has a "side-of-tower" mounting to give directional effect toward Gary. Air type coaxial cable is used between the transmitter-receiver and the antenna to reduce loss of power and to improve transmission.

Has stand-by unit

The base station at Kirk Yard has a standby unit which can be cut in by throwing a switch to keep the station operative in event of failure. The base station at South Chicago is comprised of an AAR plug-in type radio which may be easily replaced for routine maintenance.

Each base station is under the direct supervision of a control point as required and defined by the Federal Communications Commission. Dispatch points may also control the base station, just as a control point does. However, in case of need, the control point has the ability to disconnect, from transmitter control, all dispatch points under its jurisdiction.

The South Chicago base station has one remote-control point. It is in service 24 hr per day. The Kirk Yard base-station control point is located in the garage of the supervisor of scales and work equipment. Ordinarily, the latter station is in service 16 hr per day but may be kept in operation for longer periods depending on conditions.

Four remote control consoles, one placed at each of the remote-control points, transmit through the Kirk Yard base station. In the call system used these points are identified by base numbers. Base No. 1 is located on the desk in the roadmaster's office. Base No. 2 is the one in the garage of the supervisor of scales and work equipment. Base No. 3 is in the track supervisor's office at the Gary plant and Base No. 4 is located in the track supervisor's office at Kirk Yard. Base No. 5 is assigned to the South Chicago station and is located in the track supervisor's office at that point.

Each of the Kirk Yard base-station remote-control consoles has an intercom feature which permits communication between stations without going on the air. Each of these consoles is connected with the base station by underground cable, except that the one to Gary Mill uses wires leased from the telephone company. Each has a button which, when pressed, seizes control of the transmitter. However, the control point at the base stations can override the dispatch points.

The 17 mobile units, designated Motrac auto radios, broadcast with 25-watt power. Two types of these units were used: One is a 12-volt type and the other a 6/12-volt type, depending upon the battery used in the vehicle. The latter type will be used with the 6-volt battery ve-



and foremen

hicles until such time that these are replaced by new vehicles having 12-volt batteries. Depending upon operating conditions, some of the trucks are equipped with an over-drive on the generator drive to deliver the full-charging rate while the truck motors are idling.

Each mobile unit has a "Power Voice" (transistorized) speaker which gives a high output. The advantage of this type speaker for M/W use is that it can be removed from the set and hung outside the window. Hence, the men can hear calls when away from their vehicles.

For the most part, the Handie-Talkie sets are assigned to foremen. However, other sets have been assigned to the assistant roadmaster, track supervisors, B&B supervisor, welding supervisor, assistant supervisor of work equipment and signal supervisor for their use while away from their offices.

Each of the Handie-Talkies has a speaker built into it. This enables the foreman, or other employee, to be called without requiring that the handset be held to his ear at all times. These sets have dry-cell battery packs delivering 1 watt of power. These batteries function well for from 8 to 10 days, after which they must be replaced.

The M/W radio system was replaced in operation on February 1, 1961. Prior to this date, the road, in cooperation with Motorola, con-

How radio saved bridge from destruction by fire

During the first week it was in operation, the radio was put to use in an emergency with resulting savings sufficient to pay for the cost of the system for the next several years. Here is what happened:

Shortly after lunch, while on his way to South Chicago via the Indiana toll road, Roadmaster Dangremond received a radio call from a timekeeper of the Gary Mill division advising him that two main-line timber trestles over the Grand Calumet river were threatened by a grass fire that was burning furiously on the right of way. These structures, both more than 200 ft. long, were approximately 60 ft apart. The roadmaster continued on the toll road toward the site, which was adjacent to the railroad. The B&B supervisors, hearing the same radio message, also approached the site.

From his elevated vantage point, Roadmaster Dangremond saw that the fire was moving toward the bridge and was only about 500 ft away from them. The vegetation, being coated with an oily substance, added considerable fuel to the conflagration.

Over his mobile radio, the roadmaster called his office and instructed his timekeeper to call the nearest fire department and request that apparatus be sent to the site. Still using his

radio he also called the B&B and track crews, instructing them to proceed to the scene in their trucks.

Before these crews could arrive, however, a high wind caused the fire to reach the river where it ignited an oil slick that carried the flame to the nearest bridge. In minutes, the whole structure was ablaze. When the truck crews arrived both bridges were burning. Although too late to contain the fire on the first structure, they were able to extinguish the flames on the second bridge.

With Assistant Roadmaster E. V. Paige accompanying the fire-department apparatus with his Handie-Talkie, the roadmaster, using his radio, was able to direct the firemen on a route where they could reach the site. Also too late to save the first bridge, the firemen assisted the railroad crews by keeping the second one soaked with water, preventing its destruction.

EJ&E officers are convinced that, without radio, the second bridge would also have been lost. In addition, the road would have had the expense of detouring traffic, with consequent delays. It is interesting to note that the chief engineer in Joliet was able to listen over his telephone to the radio reports on the progress of the fire fighting.

ducted an indoctrination course of several meetings with all employees who would be involved in the use of the system. This covered such matters as proper identification procedure, operating requirements as governed by rules of the Federal Communications Commission, and the operation of the equipment. Each man attending the course was issued a copy of general and operating rules for railroad radio.

Today, practically all communication between foremen and supervisors is carried out by radio. At the beginning of the work day, each foreman reports to his supervisor, telling him how many men he is working, and obtains his complete work assignments for that day. Advice on any changes in work requirements made during the day, whether initiated by the supervisor or the foremen, is transmitted by radio.

Work assignments are handled in the same manner for welding outfits, service men, and T&T and signal forces.

Handles emergencies

Pointing out some of the advantages of radio, R. V. Dangremond says:

"When an emergency occurred in the days before we had radio the supervisor of track would try to contact the foreman of the nearest gang by telephone, which might be a half mile away from the gang. Failing this, he would have to get in his car and find the gang. All of this took time. With radio, the supervisor is in contact with the foreman within a minute. The foreman immediately sends a man to investigate the trouble. After appraising the situation, he reports whether the whole gang or just one or two men are required. This not only saves time in getting men and needed equipment to the source of trouble, but precludes drawing more men than necessary from their work.

"In the case of a derailment, necessary track repairs are made sooner than before. With radio it is frequently possible to hand the track back to the operating department a half hour earlier.

"The effect of breakdowns of M/W equipment is minimized. Since repairmen can get out to the job quicker, the gang is back at work sooner. Although we don't have radio on our cranes and other work equipment, these units usually work

(Continued on page 50)



News briefs in pictures . . .

Big tree hurdles tracks

What is probably one of the biggest living-tree transplants ever undertaken occurred when a 75-ton, 80-year-old banyan tree was moved 10 miles cross country at a cost of \$11,000. It will become the main natural entrance archway to a millionaire's land development project designated Palm Beach Gardens, Fla. The 60-ft high tree ran into a hurdle problem when it reached the tracks of the Florida East Coast. Two 40-ton draglines, one on each side of the railroad embankment and each anchored by two bulldozers, passed the giant tree with its spreading branches 20 ft in the air over telephone wires on one side and under high-tension lines on the other. Three times during this three-hour hazardous operation, the leafy cargo snapped the cables. As a result, three passenger trains were delayed, among them the road's crack Champion, which was held up 30 min.



Milwaukee puts new commuter station in service

Glenview (Ill.) commuters were treated to free coffee and doughnuts on May 5 to mark the formal opening of a new station built by the Milwaukee Road at that point. The new structure, 24 ft by 76 ft in size, is of Williamsburg Colonial design with exterior walls of smooth-faced red brick. Interior surfaces combine concrete block and glazed units. Two new Armco aluminized-steel shelter buildings were constructed on the opposite side of the tracks.



Small road renews ties with farm tractor

At a cost of less than \$1,000, railroad forces of the High Point, Thomasville & Denton, a line 34 miles long in North Carolina, adapted a farm tractor to tie-renewal operations. Investing in a winch, hydraulic lift, cables and structural steel, and adding flanged wheels, the road devised an on-track tie-remover-insertor. Using the converted unit, a foreman, machine operator and five men averaged 176 ties in a half mile of track in 4 hr, not including removal and redriving of spikes.



SPERRY has perfected a new device, known as the **Reflectometer**, for verifying rail defects located by detector car.

New equipment for . . .

Rail testing

INSTALLATION of ultrasonic rail-testing equipment on the Sperry fleet of detector cars was completed during 1960. This equipment is designed to detect centrally located transverse defects throughout the entire length of the rail, including the joint areas. The ultrasonic testing equipment enables small defects existing on the surface of the rail to be screened out so that more serious defects can be distinguished.

Sperry has announced that it also has completed installation of ultrasonic bolt-hole testing equipment on its detector-car fleet. The manufacturer states that the detector cars can now, by combining the ultrasonic and induction equipment, detect bolt-hole cracks and head and web separations, in addition to transverse defects.

A device, known as the Reflectometer, also has been developed by the company. It is a battery-operated instrument, about the size of a transistorized radio, which can be used to facilitate and speed hand testing of rails for verification of defects located by the detector car. *Sperry Products Company, Division of Howe Sound Company, Dept. RTS, Danbury, Conn.*

(Circle 144 on TIME-SAVER card, page 51)

Gas-fired, infra-red . . .

Switch heater

A NEW switch heater has been made available, which uses infra-red rays emitted by a number of gas-fired burner heads mounted on a manifold to heat the stock and running rails. There are no open flames or pilot lights, according to the manufacturer.

The heaters are available in units of

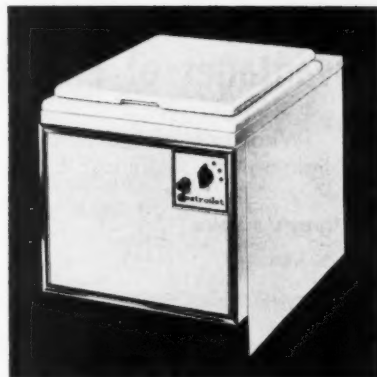
five or eight burner heads, five heads being recommended for each of the two manifolds for a 16-ft switch and eight for a 30-ft switch. Each complete package includes five or eight cast-iron burner heads, one venturi and mixing chamber which are manifolded complete ready to mount on the ties and connect to gas lines, and one 15-lb propane-gas regulator. The units are available with either manual or electric ignition. The manually ignited burners are said to be easily lit and the electric ignition units can be activated at any distance through electrical connections and a solenoid valve. *Lambert Industries, Dept. RTS, Virginia, Minn.*

(Circle 145 on TIME-SAVER card, page 51)

Propane gas used for . . .

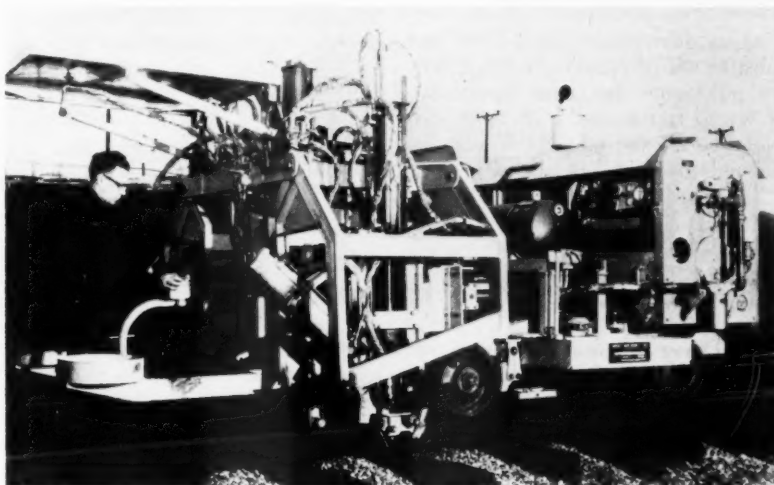
Waste disposal

A NEW waterless, non-chemical toilet is available which is designed to transform human waste into odorless, invisible, harmless vapors—primarily water vapor and carbon dioxide. Designated the Destroilet individual waste disposal unit, the device employs propane gas to consume human waste almost completely, leaving only a slight amount of ash. The manufacturer states that water, septic tanks and sewage



pipes are not needed. Some suggested applications include railroad camp cars and trailers. In addition to the gas supply, installation requirements consist of a 110-volt, 60-cycle, ac electrical outlet and a 4-in flue connection to the out-of-doors for disposing of waste vapors. Features claimed for the Destroilet unit include automatic operation once the cover is closed and the disposal button is pushed and a built-in exhaust fan for removing all odors. The unit is claimed to save approximately 25 gal of water per day for each individual using it. *LaMere Industries, Inc., Dept. RTS, Walworth, Wis.*

(Circle 146 on TIME-SAVER card, page 51)



Spike setting device for . . .

Spike driver

A NEW machine is available which sets spikes automatically for driving, nips the tie and drives up to four spikes simultaneously. Designated the Auto-Spiker, the machine is stated to be the most advanced version of the RMC SpikeMaster and to completely eliminate hand setting of

spikes. The automatic spike-feeding unit gives the operator complete control of the feeding and setting of spikes. It consists of a spike magazine with air-controlled feed and a magnetic spike holder with an automatic retracting mechanism. The automatic feed assembly can be factory-installed on existing SpikeMasters. *Railway Maintenance Corporation, Dept. RTS, Pittsburgh 30, Pa.*

(Circle 147 on TIME-SAVER card, page 51)

Advantages of electric switch lamps

What are the advantages in substituting electric switch-lamp lighting for oil lamps? Explain.

Oil lamps smoke

By A. L. KEE
Roadmaster
Missouri Pacific
Little Rock, Ark.

It is my opinion that the electric switch lamps have a big advantage over the oil lamps. Oil lamps will smoke up on the inside and also require much more time for maintenance.

Maybe a few bulbs and lenses will have to be replaced in the electric switch lamps, but this is not often.

Gives brighter light

By GEORGE L. HUDSON
Chairman of the Board
Western Railroad Supply Company
Chicago

Many advantages result from the substitution of electric switch lights for oil lamps, the most important of which is the saving of labor. As everyone knows, oil lamps must be cleaned and refilled at least once

each week and, in addition to the time spent in performing this task, there is often an equal amount of travel time.

With modern types of air-depolarized batteries and long-life incandescent electric lamps, battery-operated electric switch lights require attention only once a year to replace both the battery and the lamp bulb. The lenses of electric switch lights stay clean because they are free of oil film.

AAR Signal Section reports on the economics of electric switch lighting have shown savings of from 36.9 per cent* up to 58.6 per cent** over the cost of maintaining oil lamps, and annual savings per lamp of \$12.79* and more.

In addition to the economy of electric switch lights, they have the advantage of a much stronger, brighter light, which may be the most important advantage of all.

*AAR, Signal Section Proceedings, Volume XLVIII—1950

**AAR, Signal Section Proceedings, Volume LVI—1959

Substantial savings

By G. P. MICHAEL
Track Supervisor
Chesapeake & Ohio
Clifton Forge, Va.

We have been using electric switch lamps for approximately 14 months and in most instances they have proved extremely satisfactory.

This type lamp provides better lighting, less failures, eliminates fueling, cleaning and frequent checking, thereby reducing many man-hours required for tending switch lamps. The electric lamp lowers our switch tender operation to a bi-weekly operation and only about 30 sec per lamp are required. This gives us a saving of about \$600 per month.

It is my opinion that the electric switch lamp is more efficient, more economical and easier to maintain. I highly recommend this type lamp for all medium and large yards.

Numerous advantages

By A. N. TURNQUIST
Extra Gang Foreman
Baltimore & Ohio
Mt. Jewett, Pa.

There are numerous advantages in the use of electric switch-lamp lighting. There is no need to ship

NEW QUESTIONS to be answered in September

Do you have an answer to any of the questions listed below? If so, send it in. Payment — based upon substance and length — will be made for each published answer. If you wish your name withheld, we'll gladly comply.

DEADLINE: July 31

● 1. Where track gangs must get in the clear for trains, how much on-track time should be available between trains to justify moving the machines out of a side track?

● 2. When sheet piles have been driven around a pier to make underwater repairs and water enters faster

than the pumps can dewater the area, what can be done to make the cofferdam more watertight? Explain. What other measures can be used?

● 3. When scheduling the operation of a rail-detector car, what factors determine when rail should be included in the test? Explain. Are control-cooled rails included in the test?

● 4. Seal coatings have been used successfully on bridge timbers and crossties. Would such coatings be practical for use in sealing cracks in stringers, caps and piles? If so, how should this be done? Explain.

● 5. With today's compact, mechanized track and bridge and building gangs, is labor turnover higher or lower than formerly? What are the reasons for this change?

Send answers to:

What's the Answer Editor
Railway Track & Structures
79 West Monroe Street
Chicago 3, Illinois

Do you have a question you'd like to have answered in these columns? If so, please send it in.

WOOLERY

TIE-REMOVING TEAM IS STILL THE PERFECT COMBINATION FOR FAST TIE REMOVAL AT LOWEST COST, HIGHEST EFFICIENCY!

ILLUSTRATED
BELOW: The Famous
Model NU, WOOLERY
Tie Cutter

Heavier rail and double shoulder tie plates have made the job of removing tie-ends an increasingly difficult one—but not for the WOOLERY team—the WOOLERY TIE CUTTER and the WOOLERY TIE-END REMOVER!

And still without trenching, jacking up track or disturbing the tie bed!



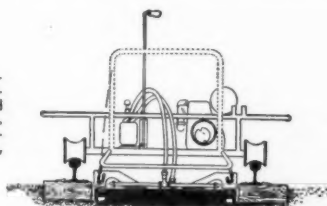
The WOOLERY Tie-Cutter cuts the tie on both sides inside the rail. The center section is then easily removed with tie-tongs and the Tie-End Remover moves in.

Maintenance men have discovered that welded rail, heavier rail, double-shoulder tie plates, *more* and *heavier* and *faster* trains have not slowed down WOOLERY efficiency.

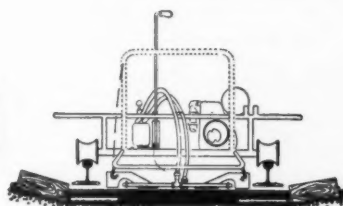
One man can still remove tie ends with no more effort than it takes to turn the air-valve on the Tie-End Remover!

It's done in less than a minute—in fact, it's so fast that the truly efficient team consists of TWO Tie-Cutters working ahead of the Tie-End Remover!

The WOOLERY Tie-End Remover consists of a double-ended hydraulic cylinder which drops into the tie bed left by removal of the center section. Note that there has been NO trenching or jacking! Keeps track smooth, safe!



A simple turn of the valve shoves the tie-ends outward—completely clear of the rail, pushing ballast ahead of it to open crib for the new tie! Hydraulically powered pistons work equally well and fast with single or double shoulder tie plates.



WOOLERY

MACHINE CO.
2919 Como Ave., S. E.
Minneapolis 14, Minn.

What's the answer? (cont'd)

and store oil, matches, wicks, globes, burners, cleaning cloths, etc.

Less time and money are spent in inspecting and maintaining such lamps, giving time that can be used in oiling and inspecting switches.

There is less chance of the switch-lamp failures that are common with oil lamps. The latter includes badly smoked lenses and light failure due to vibrations of passing trains and the entrance of moths and other large insects through ventilation openings in lamps.

During severe storms an electric lamp with a cracked lens or loose gaskets would not be apt to fail as

would a common oil-burning lamp.

The possibility of getting a supply of dirty oil could result in wholesale failure of many oil-burning lamps at one time, resulting in costly delays and hazards.

Brighter lights in electric lamps result in safer and better switching conditions.

Good investment

By W. J. YOUNG
Supervisor Signals
Bessemer & Lake Erie
Greenville, Pa.

Our oil lamps required refilling with kerosene twice a week. The open flame caused the lens and

chimney to become dirty and necessitated wiping twice a week. It was a supply problem to deliver kerosene to the outlying locations. Also, wind and vibration caused failure of the oil lamp.

Using a 1200-ampere hour battery with a 3.5-volt, 0.120-ampere bulb, it is estimated that replacement of the battery and bulb will be necessary only every 18 months.

In addition to providing a better and more reliable light, the electric lamps are less costly to maintain.

We feel that the money invested to convert from the oil to electric switch lamps earns more than 10 per cent. The electric switch-lamp installation reduces operating costs over 40 per cent.

Economy in using copper pipe

There is a growing trend toward the use of copper pipe by plumbing contractors. Does the cost of this pipe make it feasible for railroads to use? For what purposes? How should the connections to copper fittings and also to the existing iron piping be made? Explain in full.

Saves on labor

By C. F. MUELDER
Asst. to Engineer of Buildings
Chicago, Burlington & Quincy
Chicago

There is a definite trend toward the use of copper pipe by plumbing contractors. This is being reflected throughout all of industry, including the railroads.

Years ago, the cost of materials and labor was about equal in determining the overall cost of a particular project. In more recent years, the cost of labor has been increasing to such an extent that labor costs in the plumbing field now represent one-and-one-half to two times the cost of materials.

To offset the high cost of labor, the various kinds of materials available to do a job are being closely scrutinized, noting that the cheaper materials do not always result in the most economical installation. In the long run, the final cost of a proposed project is often the determining factor in deciding whether it will be done. Likewise, the expected life or durability of materials, along with the probable cost of maintenance, has largely determined what materi-

als will be used. As a consequence, materials which have a higher first cost than some other materials are often more desirable and cheaper to install because they require less labor and maintenance.

The growing trend toward the use of copper piping is an example of this situation. Three-quarter-inch-schedule 40 galvanized steel pipe costs* approximately \$0.40 per ft for material. Erection costs are approximately \$1.15, for a total cost of approximately \$1.55 per lin ft for labor and material.

Three-quarter-inch-interior copper water tubing costs approximately \$0.77 per ft for material. Erection costs are approximately \$0.75 for a total cost of about \$1.52 per lin ft for labor and materials.

Some of the more desirable features of using copper piping are:

(1) Ease of handling. Copper tubing is available in straight lengths, and 60 or 100-ft rolls.

(2) Tubing can be bent and laid around corners conforming to irregu-

lar channels or around obstructions without cutting or installing fittings.

(3) Application of fittings where required can be easily done at the specific location where needed. Tools required for this operation are relatively cheap, requiring only nominal skills. No time is lost carrying rigid pieces of pipe to a cutting or threading machine or pipe vise location.

(4) Copper is a durable element, not subject to many corrosive situations which cause black steel or galvanized steel piping to deteriorate.

(5) Copper piping and fittings are less bulky than iron or steel, requiring less space, and present a more trim appearance.

(6) Friction losses in copper piping are approximately 14 per cent less than in wrought iron or schedule 40 steel pipe. Consequently, a copper piping run, which usually also has less fittings, will carry a larger volume with less loss in line pressure. The age of copper piping usually does not enter into determining friction head losses, whereas this must be taken into account with cast iron or steel pipe.

It is the opinion of the writer that the growing trend toward the use of copper piping will continue as long as the economic relationships between it, labor and steel pipe remain the same. Present costs generally indicate that interior copper piping, 1¼ in and under, can be installed very competitively with steel piping.

For underground water mains, 2 in and under, type "K" copper wa-

*All cost figures given in this and the following paragraph are from Building Construction Cost Data (Means), 1961, 19th annual edition.

ANOTHER EXTRA FROM YOUR
OXWELD
 RAILROAD DEPARTMENT



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OXWELD RAILROAD DEPARTMENT

**LINDE
 COMPANY**

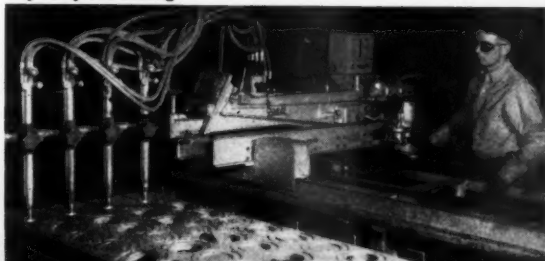
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"Ribbonrail" service

Oxy-acetylene cutting

Electric welding



What's the answer? (cont'd)

ter tube is recommended. The desirable features previously mentioned apply also to this type of installation.

Connections of copper water tubing to existing iron piping should preferably be made through an insulated fitting to aid in eliminating any possibility of electrolytic corrosion. Several manufacturers now offer threaded half-unions made of non-metallic materials which have standard threads on one end and a flared copper fitting on the other.

Connections of copper piping to copper fittings are usually made according to the type of work. Generally speaking, copper piping runs for supplying water to various plumbing fixtures have soldered fittings. Connections to plumbing fixtures are usually made with soldered fittings or half unions to the threaded ends of the fixtures.

Compression or flared-type fittings are generally used at locations where ease of dismantling is required, or in a hazardous location where a soldered joint would not be practical.

Gives longer life

By D. C. TEAL
Superintendent of Water Supply
Chesapeake & Ohio
Richmond, Va.

The growing trend toward the use of copper by plumbing contractors has become a revolution. I certainly feel that the railroads are missing the boat if they fail to follow this lead.

It should be pointed out, however, that the copper used is tubing. Copper pipe, in iron-pipe sizes with threaded joints, is too expensive for ordinary plumbing work. The copper in widespread use is specifically known as copper water tubing and is available in four different thicknesses, and in both hard and soft temper.

Copper has the advantages of longer life, freedom from "red" water problems. We feel that its ease and convenience of installation more than compensate for the slightly higher material cost. Also, for installation in existing buildings where piping must be left exposed the copper is neater and less conspicuous.

For general plumbing use, the

Type L, hard temper pipe, with sweat solder joints is most satisfactory. A very complete line of fittings and adapters is available for any conceivable connection. For use underground, the Type K, which has a greater wall thickness, is preferable. The Type M, with thinner wall than Type L, is not considered satisfactory for railroad use. Thus far we have had little experience with the Type DWV copper which is designated for use above ground only, on drainage, waste and vent lines.

The technique of making satisfactory sweat solder joints is not difficult to learn and the tools required are much simpler than those required to join threaded pipe.

Economical up to 2 in.

By E. R. TRODD
Assistant Engineer
Canadian Pacific
Montreal, Que.

We find copper pipe is economical up to 2 in diameter. Over 2 in, the steel pipe, galvanized or black, is more economical.

Connections between copper and steel piping are made with special dielectric unions fitted with gaskets that isolate the different metals to prevent electrolysis.

Hard-type copper piping is being used for domestic hot and cold water, and forced hot or chilled water lines for heating and cooling buildings.

Less internal deposits

By R. A. BARDWELL
Engineer of Tests
Chicago & Eastern Illinois
Danville, Ill.

Use of copper-pipe is attractive to plumbing contractors. In the first place, their percentage mark-up of higher-priced goods gives them more profits. Also, there is possibly swifter installation time with sweated joints.

However, from information available, it is evident that copper is a very desirable material for use as a conveyor of water. In most cases, it is subject to less corrosion and internal deposits than other metallic types. Under certain conditions, the use of copper pipe is quite justifiable.

One case in mind involved the handling of a very hard, bicarbonate well water containing varying amounts of unstable iron. With galvanized pipe in such water, deposits of ferric oxide cause tubercles with aggravated localized corrosion around these rust deposits. This leads to additional deposits both of iron and of calcium carbonate caused by an alkaline condition at the cathodes of these concentration cells. Galvanized pipe in such service has a restricted life, probably not over 20 years. Copper pipe under this same condition does not allow for any corrosion deposits nor depositions of calcite to collect and its life should be unlimited.

There should be no danger of copper pipe corroding providing waters have a figure of pH 7 or more. Aggressive waters entering a copper-pipe system should be conditioned to be slightly alkaline, perhaps with the use of sodium silicate, to eliminate objectionable traces of copper in solution which are caused by slight to higher acidity. These small amounts of dissolved copper, if not abated, would lead to stains, unpalatable taste, acceleration of corrosion of galvanized tanks, toxicity to fish and some plants, besides pitting of the copper pipe itself.

Being such a good conductor, stray currents can also be a problem in corrosion of copper tubes and they must be avoided. Costwise, copper pipe will amount to at least a 60 per cent increase over galvanized pipe. This figure is based on recent installations at our new office building which has over 2000 ft, ranging in size from 2 in down ½ in.

Copper pipe should be insulated from galvanized hot-water tanks or drinking fountains to prevent galvanic action between copper and zinc, which will remove the zinc and give accelerated corrosion to iron after this coating is removed. This action in uninsulated coolers can give rise to the noticeable, unpleasant, astringent taste of zinc.

Because of this galvanic action, it is thought advisable to have nothing but copper piping within a structure when this choice is made, and not to attach copper to existing galvanized iron pipe without a thorough study of the necessity to insulate between joints to control the potential between dissimilar metals.

(Please turn to page 46)

combined

the skills and facilities of **PULLMAN-STANDARD** and **MATISA**

A more *comprehensive* line of track equipment; more *effective* sales information; faster, more *efficient* service.

Look, for example, at the two machines teamed up on this page, the P-S tie spacer and the Matisa tie renewal machine. Rely on the Matisa/Pullman-Standard team for *comprehensive* sales, *conscientious* service.

MATISA EQUIPMENT CORPORATION

1020 Washington Avenue
Chicago Heights, Illinois



The famous **MATISA TIE-RENEWAL MACHINE** takes old ties out, puts new ties in, in half the time, half the cost! Note rail clamps and hydraulic rams for lifting. Heavy knurled rollers eject or insert ties. New hydraulic boom facilitates tie-handling and stacking.

The **PULLMAN-STANDARD POWER TIE SPACER**: Fast spotting, positive holding, automatic tie squaring. Never disturbs track surface. Skewed or bunched ties handled at top speed, even following an undertrack plow.



Rail damage from broken wheels

It is customary to inspect rails after it is found that a car having a broken wheel tread has nicked the heads of rails. Who should make this inspection? When is such damage serious enough to warrant replacing these rails? Explain. If rail is not replaced, should a rail-grinding train be used?

Damage varies

By R. G. SIMMONS
General Roadmaster
Chicago, Milwaukee, St. Paul & Pacific
Chicago

It is always a "must" to inspect rails nicked by a broken wheel. In addition to inspecting these rails, the inspection must be broadened to include sufficient track in advance of the nicks to establish beyond a doubt that there is not any damage there. The inspection also must include all track traveled by the car

to the point where it was stopped and the defective wheel removed.

In all cases the first move is to place a slow order on the affected track until the extent of the damage is established.

The initial inspection is usually made by section or patrol men. This is then followed by an inspection made by the roadmaster who is usually accompanied by the division engineer.

If the damage is serious enough or of such a nature to warrant it,

the division officers usually ask for the assistance of a general roadmaster or of someone who has inspected a large amount of damaged rail.

If the damage should extend over a long distance of track where there are many miles to inspect, it will then be necessary to set up several two-man inspection units so that the amount of damage can be ascertained as quickly as possible.

I do not think anyone can establish a rule that will cover the replacing of nicked rails. Wheels break in many ways and the types of nicks vary considerably.

Some roads save some nicked rails by applying anglebars. However, this should only be done when the nicks are such that they will not effect the line or surface.

I have never considered running a rail-grinding train for the purpose of eliminating broken-wheel nicks. It is my opinion that the nicks would have to be very shallow for a grinding train to eliminate them.

Mechanizing yard maintenance

To what extent can track operations in yards and terminals be mechanized? What equipment should be regularly assigned to terminal gangs and what should be made available through division equipment pools? Explain.

Must use equipment

By N. H. MAAS
Roadmaster
Chicago & North Western
Proviso, Ill.

The degree to which track forces can be mechanized in heavily congested terminals depends upon very careful planning, very close supervision, and coordination between the operating and the track departments.

It has been my experience that, even in a busy hump yard or on a heavy-traffic switching lead, mechanized units are very definitely the answer to many problems if the work program is set up on a definite schedule with the full cooperation of the operating department. Each machine must be exploited to its greatest possible potential.

For example, several years ago we were engaged in cycle maintenance in our hump yard. During this program it was decided to relocate various tracks to provide space for

additional tracks. This required shifting each track 6½ ft. Track lengths varied from 1800 to 3200 ft. We used several methods for shifting the first track, which required two days to relocate. Then we found we could use a Burro crane as a winch for this work. We removed the lead line from the boom tip and ran it through the boom at the drum height. By working from the adjacent track, the crane then relocated the tracks in from four to six hours each, depending upon the length, which resulted in considerable savings. We have since used this method for installing long rail in hump retarders.

In connection with the above work, the following machines were used: Power drill, power jack, power wrench, 12-tool tamper, spike puller, two spike drivers and a Burro crane. The latter unloaded the new materials and removed the old materials, as well as relocated the

tracks. A 40-ton diesel crane also was used to remove spilled debris and unload fresh ballast for the final surfacing. This operation required two tracks to be taken out of service for 24 hr and a third track during the work day.

On the switch leads where the available on-track time is not sufficient to make it worth while, off-track equipment can and should be used. We use two 4-tool tampers, one of which can be used as a spike driver. However, to reduce hand work, a Burro crane is used to supply the new ties and remove the old ones.

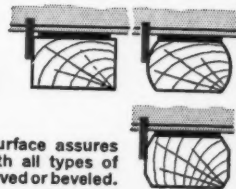
We do not assign equipment to respective gangs beyond the power drills. During the season's program of out-of-face surfacing and tie renewals, we use a spike puller, a power wrench, a power jack, a 12-tool tamper, and two spike drivers. In addition, a Burro crane services the gang with necessary material and removes the old material from the site. This crane also is used to change such rail as is necessary. A 40-ton diesel crane is used for unloading new ballast. A rubber-tired Speed Swing is also available for use in locations where needed.

While all of the above equipment is assigned to the division, it is kept



Ballast will yield before Woodings Rail Anchor will budge **WOODINGS ADVANCED TYPE RAIL ANCHOR**

The powerful spring compression, the tenacious 4-point symmetrical grip and the deep bearing surface make Woodings the world's *most powerful* rail anchor—the **BEST** for welded rail, **BEST** for machine applications, **BEST** for reapplication.



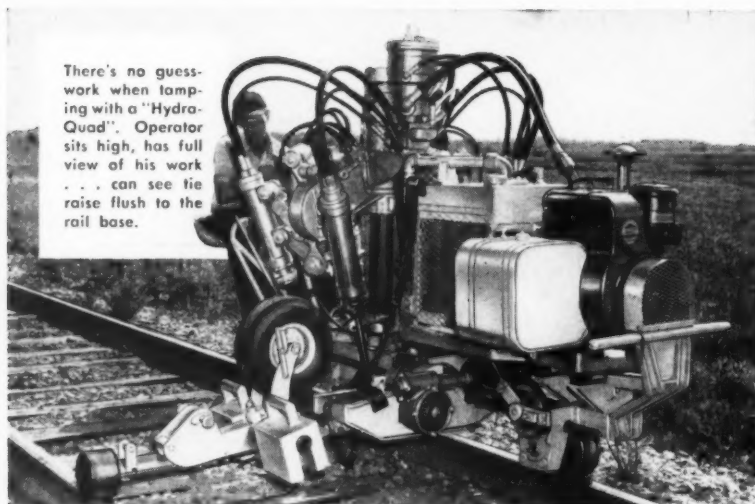
Deep bearing surface assures firm contact with all types of ties, straight, curved or beveled.



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There's no guess-work when tamping with a "Hydra-Quad". Operator sits high, has full view of his work . . . can see tie raise flush to the rail base.

Tamp a tie every 30 seconds with exclusive dual tamping action

You can spot tamp more roadbed per day, build smoother track . . . slash costs and equipment investment with a Racine "Hydra-Quad". This *job-proven* one-rail tamper combines *vibrating* action with *impact* force to compact ballast faster, more uniformly solid than usual single-action tampers. It delivers 1160 high-velocity impact blows per minute on each of four vibrating tamping tools . . . tamps an honest rate of 120 ties per hour.

Stabilizes ballast under base of rail

"Hydra-Quad" tamps uniformly under base of rail and to 18" on either side . . . in a pattern you can vary to suit your needs. It's easy to adjust for different rail heights and crooked or wider-than-average ties. Tamps over guardrail and close to switch frogs.

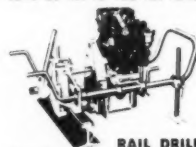
Easy removal from tracks

Built-in jack lifts entire unit for turn-around or quick set-off on rubber-tired wheels. "Hydra-Quad" is self-propelled . . . powered by 18 hp gas engine . . . starts-stops fast and travels at speeds to 12 mph. Clip and mail the coupon for location where you can see "Hydra-Quad" tamper at work . . . or check for literature on any machine in the Racine line including new "Oct-A-Gun" 2-rail tamper, and "Anchor Fast" the machine that applies anchors mechanically.

OTHER RACINE M/W COST SAVERS



RAIL SAW . . . crops rail in track . . . cuts off as little as 1/8" . . . saws 80 lb. to 155 lb. rails.



RAIL DRILL . . . clamps easily on rail . . . aligns automatically . . . drills true as set, with power feed.



UNIT TAMPER . . . self-contained and powered . . . starts fast, handles easily . . . delivers up to 1500 high-velocity blows per min.

What's the answer? (cont'd)

on the subdivision once the season's work program starts, as the loss of any of the units would affect the production of the entire organization.

It goes without saying that each subdivision of a terminal division has its own physical problems with regard to the use of power equipment. But it is my opinion that power equipment can and must be used if we are to hold the line against deferred maintenance.

Effect of bridge tie thickness

When changing out failed bridge ties on open-deck trestles, the new ties may be found to be thicker than the ones replaced. Does this make any appreciable difference? Explain. What, if anything, should be done?

Change out-of-face

By D. L. WALKER
General Foreman B&B & WS
St. Louis-San Francisco
Springfield, Mo.

It is our experience that the new ties are thicker and do not work well in spotting in on an old deck. Consequently, in order not to be forced to field new timber, we install the new ties out of face when we have a deck that is in need of general repairs and make a runoff. This keeps the surface constant and allows us to retrieve usable second-hand ties for patch work where only a few ties have failed. In this way secondhand patch ties fit the old deck where used.

Adz new ties

By J. W. CARMAN
Assistant B&B Supervisor
Missouri Pacific
Wynne, Ark.

When changing out failed bridge ties of an open-deck trestle and the old ties are not plate cut, then just

RACINE HYDRAULICS & MACHINERY, INC., DEPT. F251, RACINE, WIS.

Send literature on:

- ☐ "Hydra-Quad" tamper
☐ "Oct-A-Gun" gang tamper
☐ Rail saw
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☐ Unit tamper
☐ Rail drill

Where can I see? . . . (name of machine)
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replace failed ties with new ones. But, if the old ties are worn down by the plates, then the new ties would have to be adzed down to correspond with the old ties. This can be done by adzing the tie where it rests on the stringers or by adzing the tie-plate seat. If the tie is adzed, it should be treated with hot creosote oil and tar pitch.

If the bridge has two or more failed ties to the panel, the remaining good ties and guard timbers should be turned over. Then the thickness of the new ties will correspond with that of the old ties and the bridge will be in a good surface. A good coat of hot creosote oil and tar pitch applied to top of ties that have been turned over, and to the guard timbers, will prolong the life of the old ties. Thus, you can get the maximum life out of all ties in a bridge, and have a deck that will last for several years.

Uses standard size

By W. FUSSELL
Assistant Supervisor, B&B
Louisville & Nashville
Pensacola, Fla.

We use a standard creosoted tie on all open-deck bridges, which measures 8 in by 8 in by 9 ft. To prolong the life of the tie we use a tie plate, 7 $\frac{1}{4}$ in by 14 in. in size. The ties are sized and ready for use when received.

I would not like to use a tie of smaller size than the above because we do a lot of spotting-in of ties on bridges. The cost of using a smaller tie is prohibitive.

Biographical briefs

(Continued from page 10)

Robert W. Fondren, 36, who was recently promoted to assistant division engineer on the Southern at Greenville, S. C. (RT&S, Feb., p. 10), was born at Lynchburg, Va., and received his higher education at North Carolina State College. Mr. Fondren entered the service of the Southern in 1950 as a rodman at Charlotte, N. C. From February 1951 to August 1953 he served as a student apprentice and assistant supervisor in training. He was promoted to track supervisor at Keyville, Va., in 1953, serving also in that capacity at Charlottesville, Va. Mr. Fondren was appointed bridge and building supervisor at Greenville in 1957, the position he held at the time of his recent promotion.

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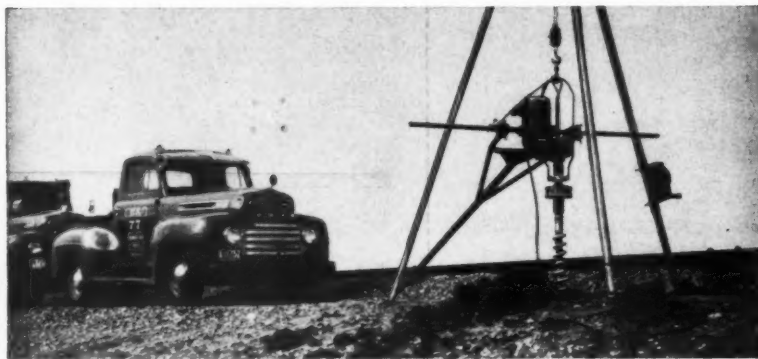
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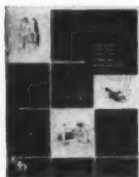


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CITY _____ STATE _____

M/W radio on EJ&E

(Continued from page 37)

in conjunction with track or bridge and building gangs which do have radio.

"Suppose a control wire breaks causing a crossing gate to fail safe, blocking traffic on a well-traveled highway. As soon as we are notified, we contact the signal supervisor by radio. The result is a signalman can be dispatched to the site of the trouble and have it corrected a whole lot sooner than before.

"In case of personal injuries, our radio has proved invaluable. We had a case where an employee developed severe pains in his side. Thanks to radio communication we had the sick man at our dispensary in a few minutes. When his pain was diagnosed as acute appendicitis, we rushed him to the hospital for an operation. Without radio it is likely a rupture would have occurred before proper medical attention could be administered.

Snow storms are still a problem but our radio system has helped here, too. Through the use of radio during the last bad storm, it was possible for a few men to keep the troublesome points open."

In accordance with the contract, Motorola maintains the radio system. This is done through a maintainer franchised by Motorola. Whenever a transistor or radio tube fails, the maintainer is called and replacements are made promptly. An inspection of the whole system is made annually.

The Gary Division supervisory officers now wonder how they got along before without radio. As Bernie Reigel, track supervisor at the Gary plant, puts it: "This radio, in my opinion, is the best thing that has happened to the M/W department for a long time. It puts the supervisor right at the side of the foreman. You can talk directly to the man who is doing the work. Decisions can be made and misunderstandings cleared up immediately—and no alibis."

The M/W radio system was designed by B. Anderhous, EJ&E's communication engineer, and W. K. Waltz, signal engineer, under the direction of A. C. Johnson, chief engineer, in cooperation with Motorola engineers.

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STRUCTURES

TIME-SAVER READER SERVICE

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Check over the items below and on the other side of this page. They refer to products described or advertised in this issue, or to free literature offered by manufacturers. If you desire additional information about any of the products, or copies of the literature, circle the corresponding numbers on one of the cards, and drop it in the mail after typing or printing your name, etc. With one card you can get information on all the items listed.

Information about epoxies

100. Clinco-Crete—Used to repair a failed concrete floor in a Rock Island building. (Page 26)

101. Building Repairs—Epoxy material used to repair terra cotta blocks on face of office building. (Page 26)

102. OsmoWeld—Wood replacer compound for reinforcing poles, piling and other timber. (Page 27)

103. Patch Kits—Offers information on adhesives for making quick, easy in-plant repairs. (Page 49)

104. Concrete Maintenance—Offers nationwide restoration service for exterior walls. (Page 49)

105. Foxolon Coating—Can be applied on all types of equipment and metal surfaces. (Page 53)

106. Chemweld—For repairing deteriorated concrete, welding prestressed members and slabs. (Page 53)

107. Zeron Coating—Resists abrasion, weather erosion, acids, alkalis, oils and greases. (Page 53)

108. Epi-Rez—Offers technical service on coatings, patching material, surfacing compounds, etc. (Page 55)

109. Epi-Cure 855—New curing agent for use in conjunction with epoxy resins. (Page 55)

110. Permagile Epoxies—Formulations for bonding, weatherproofing and topping masonry. (Page 58)

111. Adheron Coatings—Offers information on material for coating wood, metal, masonry. (Page 60)

112. Epoxy Compounds—Folder and specifications are available on coatings and mastics. (Back cover)

Other products offered by advertisers

113. Trak-Sweeper—Levels ballast ahead of tampers and removes excess ballast from ties. (Page 2)

114. Model 811 Rail Brace—Steel spring in wedge-shaped member adjusts for wear. (Page 3)

115. Jackson Track Maintainer—Offers information on production tamper. (Page 4)

116. Chemical Weed Control—Line of weed, grass and brush killers, with application service. (Page 6)

117. Ajax Water Service—Gives information on portable drinking water service for work crews. (Page 7)

118. Armco Liner Plates—Available in wide range of diameters, gauges and shapes. (Page 8)

119. Electronic Surfacing Device—Two 30-ft long beams and a computer for smoothing track. (Page 9)

120. Joint Surfacing Device—Detects low spots by means of two 14-ft aluminum beams. (Page 9)

RAILWAY TRACK & STRUCTURES

June, 1961

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TIME-SAVER Reader Service *cont'd*

121. Ureabor 31—New granular combination of three weed killers for dry application. (Page 11)

122. Ureabor 62—Chemically the same as Ureabor 31 but is double strength. (Page 11)

123. Carbonaire Batteries—Gives results of a survey showing 12-month average life of these units. (Page 12)

124. Ballast Maintenance Car—Machine does six different jobs with a single operator. (Page 14)

125. Equipment Maintenance—Gives four-point program for reducing maintenance costs. (Page 16)

126. Model MC Rail and Flange Lubricators—Points out features of units for reducing friction. (Page 19)

127. Protective Coating—Coal tar coating resists moisture, acids, alkalis and abrasion. (Page 20)

128. Channeloc Rail Anchor—One-piece anchor is forged from bar of steel in channel form. (Page 21)

129. Model D9G Crawler Tractor—New machine is designed for high-volume dozing, pushing, ripping. (Page 22)

130. Weed and Brush Killers—Chemicals available for spraying near highly sensitive crops. (Page 24)

131. Model NU Tie Cutter—Cuts tie inside rail to permit removal of center section. (Page 41)

132. Rail Welding—Offers services for welding rails into long strings. (Page 43)

133. Tie-Renewal Machine—Is equipped with a new hydraulic boom for handling or stacking ties. (Page 45)

134. Power Tie Spacer—Automatically squares ties without disturbing track surface. (Page 45)

135. Woodings Rail Anchor—Points out features of anchor and advantages of its use. (Page 47)

136. Model 40 Burro Crane Ditcher—Has long digging radius for ditching and loading cars. (Page 53)

137. Snow Detector—Automatically puts switch heaters into action when conditions warrant use. (Page 54)

138. Rail-Tel Gas Heater—Burns propane, natural or city gas. Equipped with automatic ignition. (Page 54)

139. Model A5 Track Jack—New model eliminates need for both high and low-lift jacks. (Page 57)

140. M-1300 Switch Point Roller—Carries weight of points to make switch easy to throw. (Page 57)

141. Lights for Motor Cars—Portable headlight with hold-down bracket and tail lights. (Page 59)

142. Tool and Supply Car—Tubular steel unit weighs 140 lb and has a capacity of 2000 lb. (Page 59)

143. Railway Spring Washers—Designed to maintain constant tension to keep bolts tight. (Inside back cover)

Items described in Product Section

144. Rail Testing Equipment—Ultrasonic units test entire length of rail, including joints. (Page 39)

145. Switch Heater—Uses infra-red rays to heat the stock and running rails. (Page 39)

146. Waste Disposal Unit—New toilet uses propane gas to consume human waste almost completely. (Page 39)

147. Auto-Spiker—Automatically feeds spikes to each of four guns on RMC SpikeMaster. (Page 39)

148. Hydraulic Derrick—Center-mounted unit can be operated from a rotating crow's nest. (Page 54)

149. Jib-Boom Crane—Hydraulic unit has a lifting capacity of 2,200 lb at 17-ft reach. (Page 54)

150. Portable Sandblaster—Operates on the same air hook-up as any production spray gun. (Page 56)

Free literature offered by advertisers

151. "Hydra-Quad" Tamper—Racine will send literature on this one-rail tamper. Also on its "Oct-A-Gun" gang tamper (No. 152 on card), rail saw (No. 153), anchor applicator (No. 154), unit tamper (No. 155), and rail drill (No. 156). (Page 48)

157. Ka-Mo Earth Drills—Engineering bulletin is available on drill selection, boring capacities. (Page 50)

158. Maintenance Equipment—Offers catalogs on painting and lubricating units and pumps. (Page 50)

Free literature offered by manufacturers

159. Epoxy Resins—A loose-leaf manual entitled "Jones-Dabney Epi-Rez Epoxy Resins" presents technical data and various formulations of resins, curing agents, modifiers and fillers for producing desired results. Jones-Dabney Company.

160. Lubrication Guide—This 88-page illustrated booklet is a comprehensive guide for the lubrication and maintenance of engines and heavy grading equipment. Railroad men will find this information very helpful. Gulf Oil Corporation.

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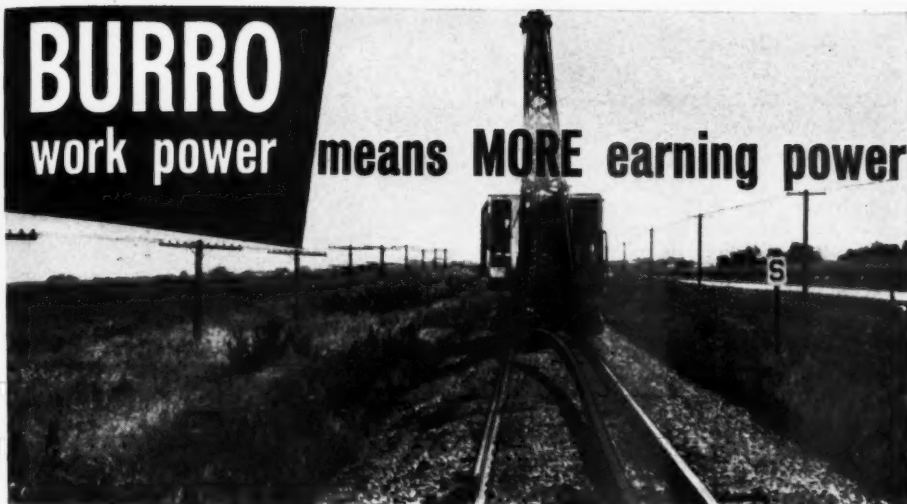
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Products

(Continued from page 39)

Operated from crow's-nest . . .

Hydraulic derrick

THE NEW Holan 7700 center-mounted hydraulic derrick is available which can be operated from a rotating crow's nest. It requires only 18 to 26 in of mounting space, depending on the mounting and jack choice, and can be mounted on the truck chassis at any point behind the cab. The derrick, including the base, superstructure and hydraulic outriggers, is built as an integral unit to minimize body and

derrick stresses. The 7700 derrick is equipped with an extendible 7-ft boom and has a maximum head-sheave height of 32 ft and a minimum height of 30 in. It can be equipped with any of three Holan earth borers—the 3-speed 5400, the 4450 and the 4401-H.

The operator controls the machine from the crow's nest where he has an unobstructed view of the work area. From this position he can dig, "live boom" up to 9,000 lb, rotate 360 deg in either direction and extend and retract the boom. The standard machine has a hydraulically driven winch mounted in the base of the derrick. It also has an offset sheave design which holds the pole away from the derrick leg to provide additional clearance for

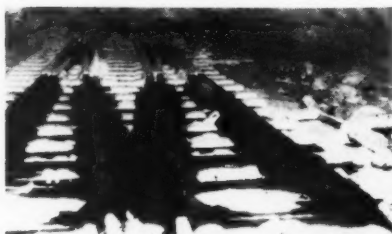


pole handling. Optional equipment includes a semi-automatic locking device for the earth borer, a fiberglass boom extension with or without bucket and a winch-mounting on the rotating superstructure. Holan Corporation, Dept. RTS, 4100 West 150th St., Cleveland 35, Ohio.

(Circle 148 on TIME-SAVER card, page 51)



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Rails Co. SNOW DETECTOR DETECTS

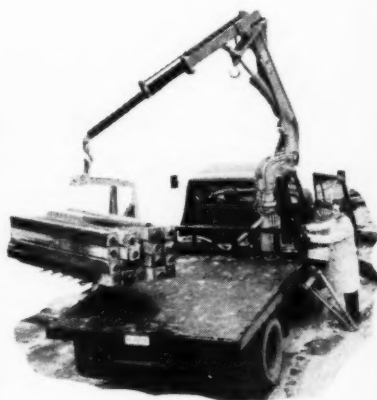
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Get full details on Rails Co. Snow Detector!
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The RAILS Company

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Lift up to 6,600 lb with . . .

Jib-boom crane

A NEW hydraulic jib-boom-type crane is available which has a lifting capacity of 2,200 lb at maximum reach and 6,600 lb with a short boom. Designated the Model F-6600ZX Foco-Crane, it is designed to be side-mounted on an open-bed truck or trailer. This location is stated to provide the crane with maximum reach and strength with minimum weight. It is equipped with a fully articulated boom which elevates, depresses, turns, telescopes and "elbows." In addition, the boom telescopes and folds into a 15-in space behind the truck cab. All gears, running cables, pulleys, winches and similar components have been eliminated.

The unit has a maximum lifting height of 24 ft, a maximum depression of 4 ft 5 in below ground level and a maximum reach of 17 ft from center of truck. It weighs 1900 lb installed, rotates through 280 deg and operates from the truck's power takeoff. A full line of accessories is available, including hydraulic clamshell and orange-peel buckets. Focowil Corporation, Dept. RTS, Chicago 3.

(Circle 149 on TIME-SAVER card, page 51)

(Please turn to page 56)

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A complete data sheet showing how this unique material might improve your products in workability and performance is yours on request.



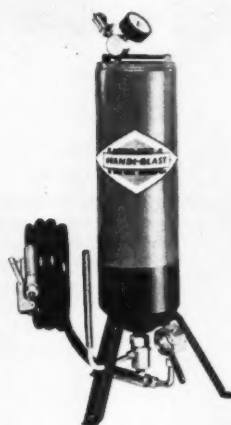
Pioneers In The
Development and Manufacture
of Epoxy Resins!



DOUBLE-U Rail Anchor
Achuff Railway Supply Co.

5627 Manchester Ave. St. Louis 10, Mo.

Products (cont'd)



Built-in sand funnel for . . .

Sandblaster

DESIGNED to operate with abrasives between 20 and 100-mesh, the new Model 28A "Handi-Blast" portable sandblaster will operate on the same air hook-up as any production spray gun. The unit is 29 in high, weighs 24 lb and has a capacity of 28 lb of sand. It is equipped with a carrying handle for easy transporting from one location to another. Features claimed for the Handi-Blast include a built-in funnel for filling the tank with abrasives, a filler valve that automatically opens and closes with tank pressure, a specially designed three-position "Vari-Flow" air valve, a fully adjustable sand-flow valve and a specially designed chamber for mixing abrasives and air under the tank. Standard equipment includes $\frac{3}{32}$ -in and $\frac{5}{32}$ -in nozzles, pressure gauge and pressure relief valve. The new unit has a squeeze-grip abrasive delivery nozzle which allows the operator to control and shut off the flow of abrasive at will. *Handi-Blast Division, Hamill Manufacturing Company, Inc., Dept. RTS, Washington, Mich.*

(Circle 150 on TIME-SAVER card, page 51)

Association news

American Railway Engineering Association

A number of standing committees of the AREA have scheduled meetings to be held in June. These include:

Buildings, June 22-23, Sheraton-Cleveland Hotel, Cleveland, Ohio, including an inspection trip to a laboratory on the 23rd; Highways, June 23, Room 707, Association headquarters, Chicago; Yards and Terminals, June 26-27, Sheraton-Mount Royal Hotel, Montreal, Que., including an inspection trip to the CNR's new retarder yard on the 27th; Economics of Railway Location and Operation, June 23, Curtis Hotel, Minneapolis, Minn.; and Impact and Bridge Stresses, June 20-21, AAR research center, Chicago.

N. D. Howard, executive secretary of the association, has announced that as of April 20 a total of 52 students at 19 different universities had enrolled as student affiliates. Inaugurated last fall, the plan provides affiliates with the association's technical bulletins, the convention issues of the AREA News and the 12 regular issues of *Railway Track and Structures*.

Bridge & Building Association

A meeting of the Executive committee of the association will be held on June 26 at the Engineers' Club, Chicago. Main item on the agenda will be the discussion of plans for the annual meeting to be held on September 18-20 at the Conrad Hilton Hotel, Chicago, concurrently with the convention of the Roadmasters' Association. The committee will also review at least some of the committee reports on special subjects to be presented at the meeting in September.

Roadmasters' Association

The Executive committee of Roadmasters' Association met on May 8 at the Engineers' Club, Chicago, with President Earl F. Snyder presiding. Preliminary plans for the annual meeting to be held on September 18-20 at the Conrad Hilton Hotel, Chicago, were discussed. As usual, the convention will be held concurrently with that of the Bridge and Building Association. The committee also reviewed the reports of two special subjects committees and one standing committee, all to be presented at the convention. Reports of the other special subjects and standing committees will be reviewed at the next meeting of the executive committee which will be held on July 10, also at the Engineers' Club.

Ray T. Johnson, Jr., president of the Association of Track and Structure Suppliers, and P. J. Wolfe, first vice president of the AT&SS, were present at the meeting. They outlined tentative plans for the next exhibit of the AT&SS, which will be held in conjunction with the 1962 concurrent conventions of the Roadmasters' and Bridge and Building Associations. The exhibit will be held in McCormick Place, Chicago's new lakeside exhibition center.

Northwest Maintenance of Way Club

At the annual meeting of the club, held at Coleman's Cafe, St. Paul, Minn., on April 28, the following officers were elected to serve during the 1961-62 season: President—John L. Jensen, chief engineer, Minnesota Transfer Railway and St. Paul Union Depot, St. Paul, who was promoted from first vice president; first vice president—B. G. Anderson, assistant chief engineer, Great Northern, St. Paul, who was advanced from second vice president; second vice president—A. S. Krefting, chief engineer, Soo Line, Minneapolis; executive secretary—G. P. Haigh, representative, Stan H. Haigh Co., St. Paul. E. L. Roland, roadmaster's clerk, Milwaukee, Minneapolis, was re-elected secretary-treasurer.

(Please turn to page 58)

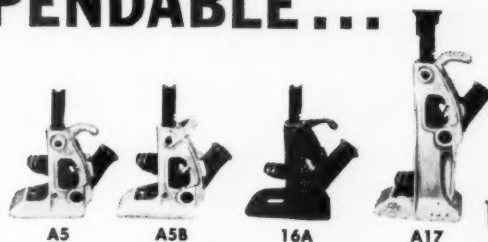
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Association news (cont'd)

Metropolitan Maintenance of Way Club

At a meeting of the club held at the Railroad & Machinery Club, New York, on April 27, the following officers were elected to serve during the ensuing year: President—J. W. Cummings, supervisor of work equipment, Delaware & Hudson, Colonie, N. Y., who was promoted from first vice president; first vice president—P. J. Harnish, regional engineer, Pennsylvania, New York, who was advanced from second vice president; second vice president—J. J. Quinn, superintendent of track and structures, New York City Transit Authority, Brooklyn, N. Y. R. H. Craib, associate editor, *Railway Age*, New York, was re-elected secretary treasurer.

Maintenance of Way Club of Chicago

Officers for the 1961-62 season of the club were elected at the annual business meeting which was held at the Midland hotel on April 24. The new officers are: President—Charles E. Weller, assistant engineer maintenance of way, Illinois Central, who was advanced from first vice president; first vice president—M. H. Dick, editor, *Railway Track and Structures*, who was promoted from second vice president; second vice president—Arthur B. Hillman, Jr., chief engineer, Belt Railway of Chicago and Chicago & Western Indiana. Maurice S. Reid, assistant chief engineer—maintenance, Chicago & North Western, and Joseph S. Kopeck, assistant engineer, Milwaukee Road, were re-elected executive secretary and secretary-treasurer, respectively.

The following were elected to serve as directors for terms of two years: Herbert G. Dennis, engineer maintenance of way, Chicago, Rock Island & Pacific; Carroll R. Merriman, engineer maintenance of way and structures, Chicago, South Shore & South Bend; and Thomas L. Hoffman, sales representative, Kershaw Manufacturing Company.

Supply trade news

ADAMS & WESTLAKE CO.—This company has been appointed a fabricator and distributor of Armaplate, the rubber-covered steel sheet marketed by the Goodyear Tire & Rubber Co. Adams & Westlake maintains headquarters at Elkhart, Ind.

AIR REDUCTION SALES—S. S. Bruce, Jr., assistant manager of railroad marketing, has been promoted to manager of the National Railroad Sales Department at Pittsburgh, Pa., succeeding D. J. Williams who retired on June 1, according to an announcement by E. S. Twining, Jr., vice president-marketing. In his new position, Mr. Bruce will coordinate all sales and distribution of Airco products to the railroad industry. He is a graduate of Franklin & Marshall College and joined Airco in 1946 as a sales representative in the rail-

road department. Mr. Bruce was promoted to manager of the Chicago District in 1954 and to manager of the Pittsburgh District two years later. Subsequently he was further promoted to assistant manager of railroad marketing.

CHIPMAN CHEMICAL COMPANY—Warren W. Brooks has been appointed sales representative and technical advisor for the St. Paul (Minn.) district, with headquarters at 786 North St. Albans St., St. Paul. He attended the University of Minnesota and formerly was supervisor of wood preservation for the National Pole and Treating Division, Minnesota & Ontario Paper Co.

L. B. FOSTER COMPANY—G. W. Campbell has been appointed sales representative at Houston, Tex.

NORDBERG MANUFACTURING COMPANY—Howard L. Phillips has been appointed manager of the International Division, succeeding B. T. Egerton, retired.

Obituary

Jay Lyman Hench, 76, chairman of the board of Mid-West Forging & Manufacturing Company, Chicago, died on April 16 at Hinsdale, Ill., after a long illness.

Eugene Harbeck, district sales manager, The National Lock Washer Company, Chicago, died on May 9 at his home in Glenview, Ill., at the age of 61.

Raymond L. Morrison, Sr., president of the Morrison Railway Supply Company and International Railway Car Company, Buffalo, N. Y., died on April 27 at the age of 64. Mr. Morrison's many years of service to the railroad industry began as shop foreman of Morrison & Rismann Company, a firm in which his father was a partner. His connection with Morrison Railway Supply Company began as head of the sales department. Mr. Morrison served as general manager and vice president prior to his election as president of the company.

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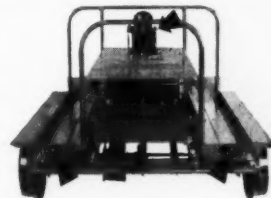
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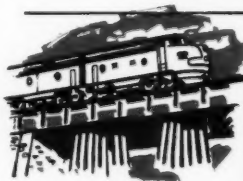
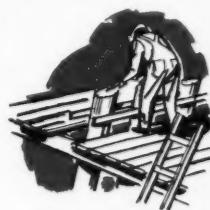
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